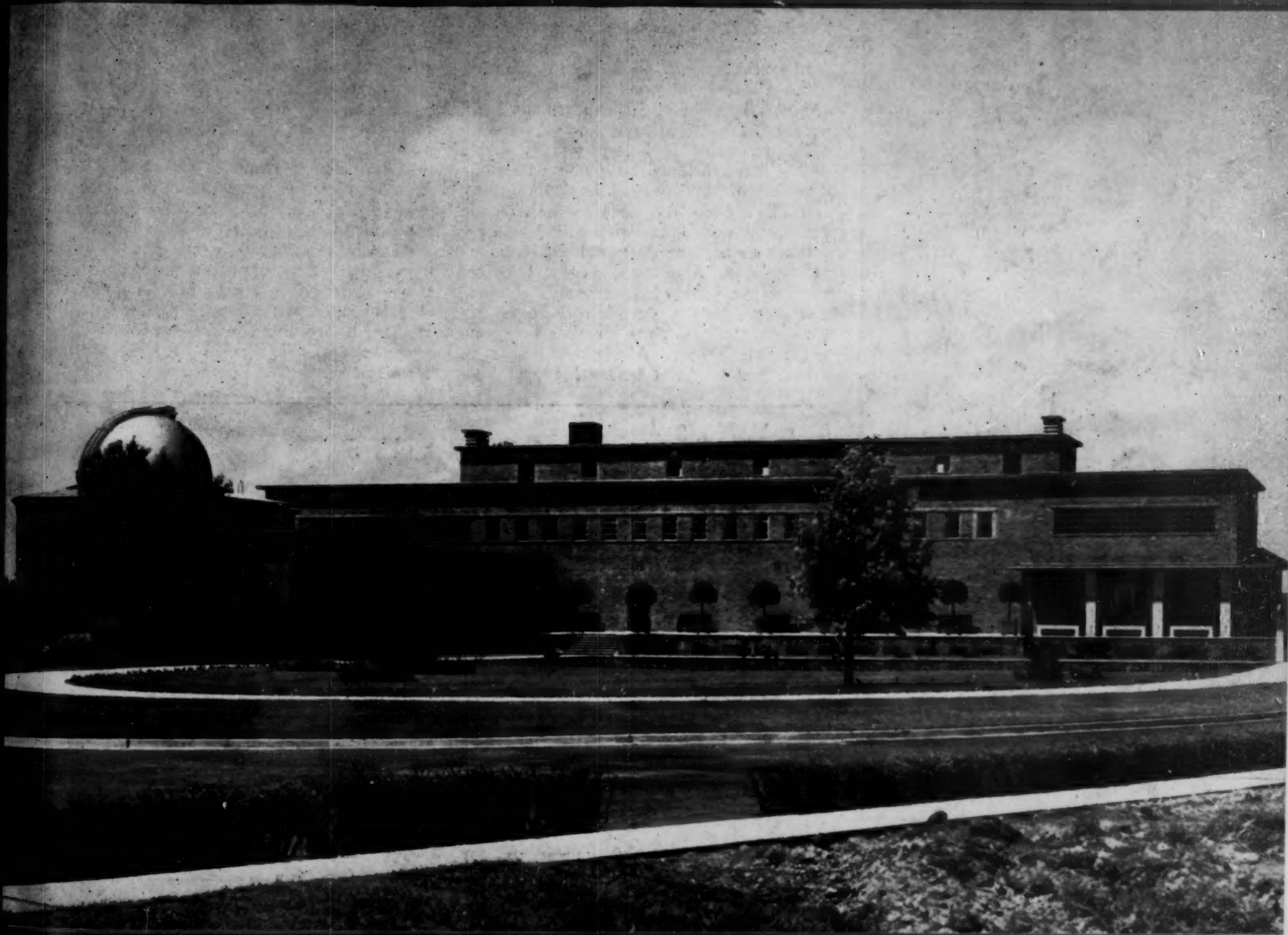
Sky and TELESCOPE



Cranbrook Institute of Science

In This Issue:

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Sky and TELESCOPE

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CHARLES A. FEDERER, JR., *Editor*; HELEN S. FEDERER, *Managing Editor*

THE TOTAL ECLIPSE OF MAY 20, 1947

INTEREST is growing rapidly in the eclipse of next May 20th, the first since the close of the war and one which promises to attract a large number of observers to the path of totality. The eclipse starts in the Pacific Ocean at longitude 77° 46′ west, latitude 36° 30′ south, off the coast of Chili; it crosses the South American continent, the Atlantic Ocean, and ends at longitude 36° 58′ east, latitude 2° 12′ south, near Lake Victoria, South Africa.

The center of the belt of totality passes nearly through Santiago, Chile, where the duration of totality will be 2.4 minutes, and Bahia (Sao Salvador) on the Atlantic seaboard, where totality will last over 4.2 minutes. The National Observatory at Cordoba, Argentina, is located just outside the path of the moon's shadow, and although the duration there is less than on the coast, the weather prospects are much better. About 1.4 inches of rain fall at Cordoba during May, whereas over 10 inches fall at Bahia that month, 24 out of 31 days having some rain.

This information is taken from a pamphlet prepared by Sr. Alfredo Voelsch, of the Cordoba Observatory, and distributed with the aid of members of the Asociacion Argentina "Amigos de la Astronomia." Maps, tables, and many relevant details for the South American portion of the eclipse, including complete meteorological data, are given in this excellent publication. For those who can read Spanish, or who do not mind the relatively simple chore of translating the few technical words which do not resemble English, Sr. Voelsch's book is recommended.

Already reports are coming in of the plans of various expeditions to observe this eclipse. For amateurs and professionals alike, it affords an excellent chance to combine astronomy with a visit to our neighbors in the Southern Hemisphere.

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CONTENTS

COVER: The Cranbrook Institute of Science at Bloomfield Hills, Mich., where the principal sessions of the Fourth National Convention of Amateur Astronomers will be held on July 5-7, 1946. Photograph, courtesy Cranbrook Institute of Science. (See page 12.)

BACK COVER: A portion of the moon near first quarter, from a Lick Observatory photograph taken with the 36-inch refractor by J. H. Moore and J. F. Chappell. The reproduction is reduced 10 to 7 from a 7.8 enlargement of the original negative. (See In Focus.)

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A. A. V. S. O. SPRING MEETING

Reaching the Millionth Observation

BY JOCELYN R. GILL, *Smith College Observatory*

AT THE INVITATION of Dr. Marjorie Williams, director of the Smith College Observatory, the American Association of Variable Star Observers held its spring meeting May 3rd and 4th in Northampton, Mass. This year marks the 60th anniversary of the founding of Smith College Observatory, the original building and equipment of which were given in 1886 as a tribute of affection to two women, Henrietta Chapin Seelye and Sarah Tappan Williston, by their husbands, President Harold L. Clark Seelye and Trustee A. Lyman Williston, both of the college.

Early Friday afternoon some of the members from distant parts began to arrive. Over cups of tea in the observatory library, they recalled past astronomical gatherings or they compared methods of observing. By eight in the evening, most of those coming had arrived, either for the council meeting or just to enjoy seeing their friends again. With good seeing prevailing, both telescopes, the 11-inch and the 6-inch refractors, were in constant use.

President Charles H. Smiley opened the Saturday morning session. A hearty welcome was extended to the A.A.V.S.O. by Dr. Williams on behalf of the staff and students of the astronomy department. In an account of the history of Smith College Observatory, she related that the original building and equipment, including the 11-inch refractor and the 4-inch transit instrument, were purchased in 1886, but that the classroom, in which the meeting was held, was built in 1900 for the purpose of teaching astronomy by the laboratory method. The first director of the observatory, Mary E. Byrd, was herself a strong proponent of this method. She was the first of a series of women astronomers at Smith, including Harriet W. Bigelow, president of the A.A.V.S.O. in 1933, and Mary Murray Hopkins, well-remembered teacher, who devoted themselves to maintaining the work at Smith at a level comparable with that of other similar observatories.

In 1911 the 6-inch refractor was added to the equipment. As the college buildings encroached more and more on the observatory's horizon, the roof of the recently built wing of the college library was utilized as an additional observing site, and a 3-inch Ross camera is now housed there. Miss Williams stated that the 60-year-old observatory would probably be torn down in the next few years, since plans for a new physical science building are now under way, and the proposal is to put the astronomy department on the top floor, with observing equipment on the roof.

David W. Rosebrugh gave an illustrated account of "A Colored Sunspot of March 23rd," and of observations of Mars. The purpose of his remarks on the famous planet, he stated, was "not to stimulate a Mars' section," but to illustrate how much enjoyment an A.A.V.S.O.'er could have on a busman's holiday.

"A Polaroid Filter for Solar and Lunar Observing" was described by Cyrus F. Fernald. He said that the filter made it possible to observe sunspots through haze and facilitated observations of occultations with a full moon. (See Gleanings for A.T.M.s, this issue.) He also made a plea for observations of telescopic meteors, pointing out that these could easily be made in conjunction with other observing programs and reports could be sent to the American Meteor Society. The morning session was concluded with a paper by Paul H. Nadeau, of Quebec, on "Weather Cycles and Sunspot Activity," read by Neal J. Heines, chairman of the society's solar division.

A group picture was taken on the steps of the observatory, and the members then adjourned for luncheon at the Hotel Northampton (famous for Wiggins Tavern and the Country Store). It was then that we heard Recorder Leon Campbell's long-awaited pronouncement

A pioneer in the A.A.V.S.O. was William Tyler Olcott, also well known for his books on astronomy. Photo by Wm. Henry.

— the culmination of 35 years of work on the part of numerous members of the A.A.V.S.O. — *the attainment of the millionth observation*. Suspense filled the room while the members waited for the name of the person who had made not a million, but the millionth.

Credit for this noteworthy achievement went to the travel-minded Dr. W. L. Holt, retired physician from Scarboro, Me., and lately of Winter Park, Fla., Tucson, Ariz., and Amherst, Mass. Dr. Holt sent to the recorder in mid-April a report of 302 observations, and Mr. Campbell's tally showed that among these was the millionth. The star so honored was X Ceti, a long-period variable. The millionth contributed observation was made on March 3rd. In recognition of his achievement, Dr. Holt received a scroll duly inscribed by the president and the secretary, and, needless to say, great applause from the gathering. Dr. Holt had not been previously informed, but was fortunately present at the meeting.

Among important early workers in the A.A.V.S.O. Mr. Campbell listed: William Tyler Olcott, originator and first secretary of the society; Professor Anne S. Young, of Mt. Holyoke College, who was active in getting the observing program under way; Dr. Edward Gray and David B. Pickering, who together put the charts in usable form; and the Reverend T. C. H. Bouton, of St. Petersburg, Fla., who has been making observations from the early days of the organization. His long and continuous record (35 years) of sending in reports has brought his total of observations to 25,000. Other observers who contributed materially toward the grand total include Leslie C. Peltier, with more than 70,000 observations, E. C. Jones, with nearly 50,000, and Mr. Fernald, with 30,000 accumulated since 1937. Among the many regular observers abroad, R. G. Chandra, of Bagchar, India, has amassed 30,000 estimates since 1920. Many other observers, some of whom were present at the meeting, were mentioned and commended for their faithful work.

The Saturday afternoon session opened with a short business meeting. The large number of new members taken into the society this year are from 13 states and four foreign countries.

Mr. Heines had a busy afternoon presenting various papers by others as well as his own report. He read a paper on "Sunspots and Levels of Lakes in Minnesota," by Franklin J. Ryder. In his report of the solar division, Mr. Heines

discussed the ionospheric disturbances which occurred at the time of the large sunspot group in February. The solar-terrestrial disturbance was not as great as would have been expected had the spot area been nearer the solar equator. This sunspot group (see *Sky and Telescope*, March, 1946, page 16) had an overall length of 200,000 miles, and the leader spot was 50,000 miles across. The follower spot was at one time almost 100,000 miles across. Two complete trips around the sun were made by this area of solar activity, for the third appearance of the spot group was observed on April 17th.

The program for the observation of high-flying migratory birds as a sideline for solar observers has been getting under way. It is expected that this work will help solve some important problems of bird migration. The first recorded telescopic observation of high-flying birds was apparently made by R. A. Bray, using an 8-inch refractor on September 30, 1894, in Shere, England. Dr. Helen Sawyer Hogg, from Toronto, remarked that Mr. Nadeau had first become interested in this bird program when he "saw a sunspot flap its wings."

A letter from Dr. John A. Fleming, of the Carnegie Institution of Washington, to the solar division, expressed gratitude for the latter's observations, particularly valuable during the war period when it was difficult or impossible to get the usual observing records from Europe.

The program was concluded with a short, short paper by Dr. Smiley, entitled "Telescope Makers and Telescope Users," in which he posed the question, "Where are all the telescopes?" As an enthusiastic instructor of amateur telescope makers, Dr. Smiley pointed out the problem of wresting the telescopes from the makers, who rarely make any observations, and of getting these instruments into the hands of those who would like to use them. Evidently dozens of telescopes are made each year and stored away in attics and basements — of no use to anyone. Dr. Smiley asked the members to consider ways of getting telescopes to observers, and to make suggestions at the next meeting.

After the final session adjourned Saturday afternoon, some of the members returned home by way of Mt. Holyoke College, at South Hadley, Mass., in order to see the John Payson Williston Observatory, at the invitation of Dr. Alice Farnsworth. Unfortunately, the good weather had practically run out by that time; those who stayed in Northampton until Sunday had to journey home in the rain.

NORTH CAROLINA TO HAVE A PLANETARIUM

The first planetarium installation to be owned by a university or college is planned for the University of North Carolina at Chapel Hill, which recently received a gift of one million dollars for the erection of an art gallery and planetarium.

This combined gift was made by John Motley Morehead, of Rye, N. Y., well known as a chemical engineer and former minister to Sweden, who was one of the trustees of the Hayden Planetarium in New York at the time of its erection. Plans for the building are now being drawn up by Eggers and Higgins, of New York, and construction will begin as soon as practicable. It is hoped to procure a Zeiss type of planetarium instrument, negotiations for which have already been initiated through government as well as private channels, even though it is difficult if not impossible to have one built at the present time.

The art collection, valued at approximately $250,000, belonged to Mr. Morehead's late wife, and will be the exclusive exhibit in the main gallery, to be known as the Genevieve B. Morehead Gallery.

Unused money in the Morehead Foundation will be used for scholarships to the University of North Carolina. The donor himself will serve as chairman of the board of trustees, the other members being Norman A. Cocke, attorney, and John L. Morehead, manufacturer and cousin of the donor, both of Charlotte.

John Motley Morehead, grandfather of the present benefactor to North Carolina, was twice governor of the state, in 1840 and 1842, and is known as the "father of modern North Carolina." It is expected that public interest in science and the cause of education in science in the South will be greatly advanced by the erection of this planetarium.

ARCTIC WHITEOUT

Whiteouts are more hazardous in Alaska than blackouts. A pilot felt reasonably safe flying a course where he could see nothing at all, when suddenly he saw a reindeer springing from in front of his plane. He lost one wingtip clearance light, and lived to add his report to the many already recorded on the dangers of a peculiar condition which frequently prevails in the frozen north in late winter and early spring.

The term *arctic whiteout* is suggested by Leonard J. C. Hedine, in the *Bulletin* of the American Meteorological Society, where this problem is discussed. A moderate snow cover in the treeless tundra hides even frozen water areas; combine this with an overcast sky of cirrostratus or altostratus clouds, and no shadows are apparent. Land and sky blend into one, and a pilot without instruments might fly upside down without being aware of the fact. In locating landing posts, especially at short range, this condition is extremely hazardous to flying.

STELLAFANE CONVENTION

THE WAR is over and many of us are finding time to pursue our old hobby of telescope making. Consequently, there has been considerable demand for the Springfield telescope makers to hold again their annual Telescope Makers Convention at Stellafane. The date is set for the weekend of August 3rd, during the first quarter of the moon. The banquet and program will be that evening.

We are glad to report that Russell Porter will be here from Caltech to give the latest information on the 200-inch at Palomar. Due to the food difficulties this year, it will be extremely helpful to us if you will make your reservation for the banquet not later than July 1st, enclosing the dinner fee of $2.00 per plate. We will not be able to guarantee a seat at the "festive board" without this reservation.

There is plenty of space for tenting on Breezy Hill for those who want to rough it. The undersigned will be glad to supply on request the names of hotels in this area. Hotel reservations should be made directly, and by July 1st.

There should be a new generation of telescopes both wonderful and weird that are worthy of exhibit on Breezy Hill. There should be new telescope makers who have not subjected their creations to the scrutiny and criticism of a convention. We are looking forward to making new acquaintances and renewing old ones. Please accept this as our cordial invitation to you, your family and telescope making friends to attend our convention at Stellafane August 3rd.

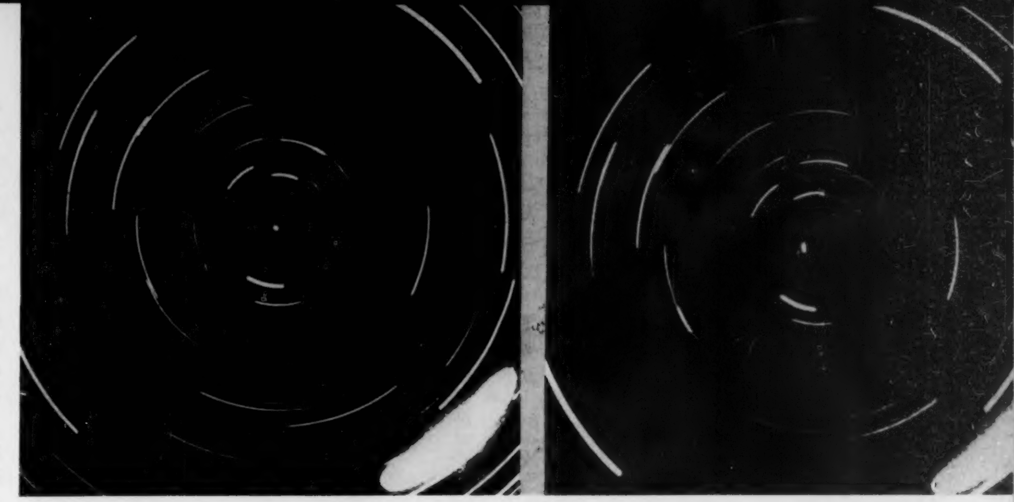
JOHN W. LOVELY, secretary
Springfield Telescope Makers
27 Pearl St., Springfield, Vt.

ECLIPSE REPORT

In the March issue of the *Journal* of the Royal Astronomical Society of Canada appears a report on the total eclipse of the sun on July 9, 1945. It is written by Dr. Alfred E. Johns, professor of mathematics at McMaster University, Hamilton, Ont., who was one of the members of the eclipse expedition to Bredenbury, where clouds prohibited all observations. The latter portion of Dr. Johns' account describes the preparations, equipment, and program of the Bredenbury group.

EPPE LORETA

We note the announcement in *Popular Astronomy* of the death of Dr. Eppe Loreta, of Bologna, Italy, in September, 1945. Loreta was widely known as an observational astronomer. He made numerous observations of variable stars, sending reports to the A.A.V.S.O. In 1933, he was the first to discover the brightening of RS Ophiuchi, the second observed maximum of that recurrent nova. He was also an ardent meteor observer, having made contributions on long-enduring meteor trains. Sunspots likewise engaged his attention.



Twin photos which show the stars between Polaris (in lower right corner, overexposed) and the pivot of the sky. The left picture was taken in 1925, the right one 10 years later, to show the shift of the pole. Yerkes Observatory photograph.

SKY FANTASIA

BY ROBERT R. COLES, *Hayden Planetarium*

A FIRST GLANCE into the realm of astronomy reveals many strange and interesting paradoxes. And further pursuit of the subject brings the student face to face with a new world whose very existence has escaped the attention of most people. To an observer with such interests, the most commonplace celestial occurrence is fraught with an endless variety of possibilities, the sky picture acquires an almost fantastic aspect, and there is rarely a dull moment.

Let us cite an illustration in the legendary steadfastness of Polaris, the North Star. Shining like a beacon, this star has guided travelers for centuries. It has gained a reputation that it shares with no other star in the heavens. In song and story it has been heralded as the one fixed and steadfast object in the universe. Even the immortal Shakespeare paid it homage in *Julius Caesar,* where the ambitious ruler expounds:

But I am constant as the northern star,
Of whose true-fixed and resting quality
There is no fellow in the firmament.

Yet, Polaris is not truly fixed and steadfast. It has long been known that this star is not located directly above the north pole of the earth — at the north celestial pole — but about a degree away from that pivotal position. And with each rotation of the earth the star appears to describe a circle around that point. Thus the North Star bears directly north only at two instants during every 24 sidereal hours. And within the circle that it describes are many dimmer stars, each of which is nearer to the north pole of the heavens than is Polaris. While these stars may be of interest to the astronomer, they are useless to the navigator since they are too dim to be observed and measured with his sextant.

But this is just the beginning of the interesting story of this star. Actually it is one of a pair of stars, the companion too dim to be seen with the naked eye. And the bright star does not shine with an absolutely steady light. It pulsates, becoming brighter and less brilliant in a definite cycle of a little less than four days. Astronomers recognize Polaris as a Cepheid variable star. Its change in brilliance is rather slight, too small to be observed with the unaided eye, yet enough to be readily detected by instruments available in the observatory. Thus, even in its light, Polaris is not constant.

If anything further be needed to destroy the illusion of constancy regarding Polaris, it is merely necessary to point out the well-known fact that this star has not always occupied the important place in the sky that it does today. Back in the days of the ancient Egyptians, the star known as Thuban (Alpha Draconis) was the north star. Thousands of years in the future, the brilliant star Vega (Alpha Lyrae) will be the nearest bright star to the north celestial pole. This is not due to change in the actual positions of the stars themselves, but results from a motion of the earth known as precession. Actually the earth is wobbling on its axis in such a way that its north and south poles are describing circles and their extensions into the heavens, the north and south celestial poles, are gradually shifting their positions against the background of stars. The word gradual is here used in its most literal sense; approximately 25,800 years are required to complete one cycle of precession.

While millions of people living in the Southern Hemisphere have never seen the North Star, practically everybody has watched the full moon slowly emerging from beyond the eastern horizon. And its appearance never fails to inspire a host of questions. Many of these deal with the changes in the color of our satellite from time to time. We are all familiar with the huge orange or sometimes blood-red orb that appears balanced momentarily on the horizon at the time of rising. Then, as one watches, it slowly climbs the sky and, at the same time, merges from red into the lighter and more familiar moon-gold. To explain this magic transformation is a challenge to the inquiring mind of the observer.

For an answer to this puzzle we must turn to the meteorologist, since the phenomenon is not astronomical. As observed from beyond the earth the color of the moon would not appear to change. But from the earth's surface we are viewing it through a dense blanket of atmosphere that tends to color all celestial objects. In this atmosphere are hundreds of billions of minute dust particles and tiny molecules of air. As the moon rises or sets, its light comes to us through a much greater depth of the atmosphere than when it is higher in the sky. And its light beams also pass close to the earth's surface where these impurities are denser than in the upper levels of the atmosphere.

As a result, the shorter wave lengths of moonlight are absorbed or scattered about, permitting mostly the long wave lengths of yellow, orange, and red to get through. On certain occasions, this effect will be more pronounced than at other times due to the presence of more dust in the atmosphere. It may be very noticeable when there are large brush fires in the vicinity of the observer, and may last for weeks or even months when there have been violent volcanic eruptions. But as the moon climbs farther above the horizon its light penetrates less of the atmospheric blanket, there is less dust to filter out the shorter wave lengths of light, and our satellite slowly assumes its familiar hue.

Another mystery that has perplexed both laymen and scientists for centuries has to do with the apparently greater diameter of the rising moon compared with the moon at or near the meridian. Everybody knows that it usually appears very much larger when observed near the horizon than after it has climbed higher in the sky. Actual measurements and photographs, however, prove that this is an illusion.

Paradox of the Nova

That star is new *to us,*
But wise men calculate
Its atoms raised a fuss
At some most ancient *date.*

CLARENCE A. ATWELL

While refraction caused by the earth's atmosphere distorts the apparent shape of the horizon moon, making it appear elliptical, with the long axis parallel to the horizon, its diameter is not perceptibly greater than when it transits the meridian. Why, then, does a rising moon look larger?

One explanation long given, but since disproved, was that the horizon moon is so situated that its size can be easily compared with the trees, buildings, and other objects with which we are generally familiar. But after it has climbed the sky we view it independently of these objects and are therefore deprived of them for comparison. The fallacy of this theory becomes evident when we learn that a moon ascending from beyond a sea horizon appears just as large, even though there are no objects available for a comparison of its size.

As a matter of fact, a moon on the observer's zenith should be larger by about 1/60 than when seen on the horizon. This is because the observer is nearly 4,000 miles nearer the moon than when it is rising or setting.

A few years ago two Harvard psychologists, Drs. E. G. Boring and A. H. Holway, arrived at what appears to be the root of the matter after conducting a series of carefully planned experiments. They concluded that the perceived horizon diameter of the moon is about two times that of the moon on the zenith, and that the illusion is due to a physiological cause: objects observed straight ahead appear larger than do those of the same size in positions where the eyes must be raised to view them. Therefore we find the problem is not astronomical or even meteorological but concerns the psychologist and physiologist. And apparently the basic causes are still somewhat of a mystery.

This illusion may be observed not only with the moon but also in the constellations. It is easily seen that the Big Dipper appears very much larger

Changes in the form of the Big Dipper in 100,000 years. Note that the middle stars move as a group.

when low on the horizon than when high in the sky. This same illusion can also be observed with the Great Square of Pegasus, the Northern Cross, and other star groups.

Already it must be apparent to the reader that the sky picture is deceiving. The stars which appear merely as scintillating points of light through even our largest telescopes are really huge suns. The constellation patterns which appear fixed and unchanging are actually breaking up so that in time, a long time, they will differ greatly from their appearance today. And, because of their tremendously great distances, we never see those stars as they are at the present time. Even the nearest beyond the sun is so remote that its light requires over four years to reach us. Most stars are seen as they were hundreds or thousands of years ago.

Furthermore, much of what we see in the sky is confined to the immediate foreground of the sky picture and is more often meteorological than astronomical. Meteors never become visible until they have entered the earth's atmosphere. Solar and lunar halos are caused by optical effects of the atmosphere. And that inspiring phenomenon, the aurora borealis, occurs within the atmospheric blanket around the earth.

During the past few months we have enjoyed a number of unusually striking displays of the northern lights. Their appearance has led to many inquiries as to their nature and cause. Here we find that some of the popular explanations are far from correct. Many have probably heard the statement that the aurora is caused by sunlight being reflected from ice in the polar regions. This is an old one that has been told and believed for several generations. If this were true, it would be difficult to explain how it is possible to have northern lights in the winter, when the sun does not shine on the ice in the far north, or how it would be possible to see auroral curtains, arches, and streamers in the east, south, and west.

Today we know that the aurora occurs in the rarefied gases of the earth's upper atmosphere and is definitely related with activity on the sun. Sunspots and tremendous disturbances in the atmosphere of our daytime star apparently expel electrical particles, which eventually strike the earth and cause the atmosphere to glow very much like the gas in a neon tube.

Indeed, the observer who watches from night to night throughout the year may enjoy a sky fantasia of weird and beautiful aspect. He looks out into the depths of space and time and learns that many things are very different than they seem to the casual watcher of the night skies.

NEW YELLOW POLAROID FILTER

A new two-in-one camera filter which does the work of a standard yellow filter and a standard polarizing filter is now available for black-and-white photography, according to an announcement by the Polaroid Corporation, Cambridge, Mass. Like a standard yellow filter, the new filter increases cloud-sky contrast and sharpens haze-covered horizons, but its polarizing feature permits reflection control and reveals surface texture and detail, at the same time darkening the sky even further without darkening foreground greens and yellows. For color photography the only practical means of darkening skies remains the standard polarizing filter, neutral in color. The new filter is a sandwich of precision-dyed yellow plastic combined with a polarizer and laminated between glass disks of optical quality by a special production technique developed during the war.

Acknowledgment and Correction

We regret to learn that for the article, "Spring and Summer Stars," in *Sky and Telescope,* May, 1946, the author inadvertently did not ask permission to quote portions of *A Guide to the Constellations,* by Barton and Barton, published by Whittlesey House. Hence, through courtesy of the publisher, we wish at this time to give proper credit to the book for a number of quotations and some paraphrasing which appeared in Miss Barry's article. Ed.

ASTRONOMICAL ANECDOTES

PERSONALITIES, SUNSPOT NOTIONS, A METEOR STRIKE, AND THAT MOON ILLUSION

THE PERSONALITIES of astronomy, past and present, are a fascinating subject of specialization. There are many strange odds and ends among them. For example, who were the three astronomers of the same family who lived for a total of 261 years? And which member of the family discovered both "extreme" comets — the one of shortest known period and the one observed to return after the longest period?

Who sued whom for his work, done in his spare time while he was associated with an observatory? The director of the observatory attached his name to the work; Simon Newcomb wrote indignant letters to editors about this unethical incident.

Who invented the sextant and received as a reward a houseful of furniture — wisely, because any cash he might have received would have been converted quickly to spirituous beverages?

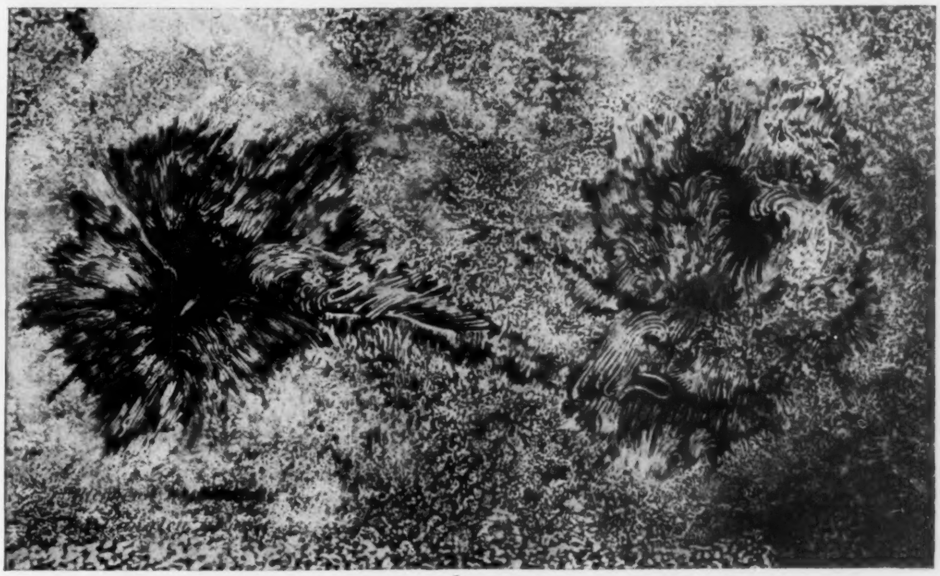
A small reward will be made for the correct answers to any three of these four questions; the postmark should be earlier than June 21st, because answers will begin to appear next month. Address R.K.M., c/o *Sky and Telescope*.

A correspondent from Milwaukee, Rev. E. Ph. Dornfeld, writes to ask if, as was stated on a radio program, William Herschel and his sister ever insisted that they noticed a light moving within a crater of the moon south of Mare Imbrium. According to the story, they concluded from this phenomenon that life exists on the moon; W. H. Pickering was said to have made the same observation and to have come to the same conclusion.

I don't know about all the details of this. It is true that Herschel observed what he thought were bright spots in the dark portion of the moon, attributing them to active volcanoes. Pickering seemed convinced that perhaps low forms of life, such as fungi, might flourish early after sunrise. He attributed some of the changes of texture and shading on the crater floors to this.

Herschel had a strange notion about the sun. He thought that the envelope we see was a cloud layer, hot on the outside but cool on the inside, so that the sun itself, a solid body, was dark and comfortable enough to support life. Where the hot clouds parted, revealing the dark solid body inside, we saw a sunspot.

Speaking of sunspots, some of those in evidence lately have been very beautifully complex, with strange whorls and details of structure of the penumbra, and bridges that change from day to day. All in all, the idea that has crossed my mind frequently has been that the famous Secchi and Langley drawings may really be the best representations of sunspots we have. Always before, these drawings have seemed to me to be better works of art than records of scientific phenomena, but in good seeing, with a 10-inch refractor, the resemblance of the current spots to those drawings has been remarkable.



A reproduction of a Langley drawing of a sunspot group (1873). Courtesy of the Smithsonian Institution.

Many months ago — to change the subject quite abruptly — the same old story was repeated from Tulsa, Okla., with some new twists. It has to do with the fall of a "flaming" meteorite. This time, the official report of the cause of a fire in the home of G. E. Thompson was as follows: "Reported origin of the fire — house hit by piece of falling star."

Several firemen saw the passage of a bright meteor. "We were sitting in front of Station 5, facing south, when suddenly a shooting star came plummeting from the sky," reported Fire Captain Walter Derrick. "Just a minute or two later we received a call that the Thompson home, a short distance away, had been hit and set afire." A neighbor is said to have seen the "sizzling" meteor strike the corner of the roof, which instantly broke into flames.

Would some Tulsa reader check up on this? The date is unknown, but there are certainly enough clues in the story to permit checking it rather thoroughly. If untrue, we should publish the fact here; if true, it is an instance that deserves full recording in the literature of meteorites.

And, to conclude with another oft-discussed problem, why does the moon appear smaller when elevated than it does close to the horizon? Please don't say, "Because when it is at the horizon we have something to compare it with." That reason is meaningless and untrue. But here is a stunt to try: next full moon, "pinch" the moon between thumb and forefinger, when the moon is just rising. Watch it shrink, then swell again as you "unpinch" it. I can't promise to give the correct answer, but I can give some ideas about it, in a month or two. R.K.M.

INTERNAL STRUCTURE OF IRON METEORITES

At the U. S. National Museum, E. P. Henderson and S. H. Perry are carrying on an analysis of the internal structure of iron meteorites. After intensive study of the New Westville, Ohio, iron found a few years ago, these scientists believe that when iron meteorites of almost identical composition differ in structure, it is a sign that the conditions through which they have passed are quite different. Heat, together with the length of time the mass remained at high temperature, probably accounts for these observed differences in structure. In addition to their present metallographical studies of many iron meteorites, the National Museum scientists plan to heat-treat the same specimens under controlled conditions to determine what significant changes take place. Eventually, they hope that the internal structure may be understood sufficiently to give a brief autobiography of each meteorite.

AMERICAN ASTRONOMERS REPORT

Here are highlights of some papers presented at the 74th meeting of the American Astronomical Society. Complete abstracts will appear in the Astronomical Journal.

Interstellar Gas and Cosmic Grains

EXCHANGE and interchange among the particles in interstellar space was the subject of an analysis by Dr. Felix Cernuschi, of Harvard College Observatory. He criticized several current theories whereby it is assumed that particles of matter in the space between the stars can grow larger by the accretion of gas particles which strike them and are eternally "frozen" to their surfaces.

It is well established that interstellar space is filled with gas and dust, the average density being about one gram for each trillion trillion cubic centimeters (10^{-24} grams per cu. cm.). The gas, consisting of atoms of various elements, is ionized by the radiation from the stars, and the average velocity of the expelled electrons corresponds to a temperature of about 10,000 degrees absolute; collisions between electrons and their parent atoms raise the cosmic gas to this temperature.

The cosmic grains, on the other hand, are like tiny black bodies in space, and they must be in equilibrium with the radiation which the stars, as a whole, continually pour upon them. Eddington supposes that the radiation in space is equal to that produced by 2,000 stars of the 1st magnitude, which may be shown to raise the temperature of solid cosmic particles to only about three degrees absolute. At this very low temperature, Lindblad and others have assumed that every gas particle which happens to strike the surface of a cosmic grain will be immediately frozen to it and captured forever.

Dr. Cernuschi, using the theory developed by Lennard-Jones and co-workers at Cambridge, England, with modifications appropriate to the physical conditions of matter in interstellar space, considers that a gas particle striking a cosmic grain might be reflected or diffracted; adsorbed on the surface for about a ten-billionth of a second and then escape with a smaller velocity; be adsorbed in one energy level and become more strongly bound to the surface at lower energy levels by giving energy to the crystal. Also, the collision might cause another adsorbed atom or molecule to escape, because the incoming particle would share its energy with other atoms already adsorbed on the surface. These processes, as the Argentinian scientist pointed out, all result from the fact that the gas particles, at 10,000 degrees, have high energies which they must share with atoms and molecules in the cosmic grains. And because the cosmic grains are so "cold," most of their oscillating particles must be in their lowest energy levels and capable of absorbing energy of only certain limited values; therefore, the efficiency of the process of sharing energy between bombarding gas particle and cosmic grain atoms is relatively low.

Thus, Dr. Cernuschi has come to the conclusion that on the average atoms striking a cosmic grain will leave with velocities greater than 7,500 degrees absolute, and that the cosmic grains cannot have grown appreciably by accretion during the present known life of the universe. He suggests, however, that the cosmic grains may have been formed in a very short time in some remote past era when, during the process of the expansion of the universe, the proper temperatures and pressures existed to enable various elements to condense into crystals.

Proposed Classification of Nova Spectra

A DECIMAL subdivision of spectral class *Q* has been proposed by Dr. Dean B. McLaughlin, of the University of Michigan Observatory. This would replace eight sub-classes recognized by the International Astronomical Union, which have had the provisional names *Qa, Qb, Qc, Qd, Qu, Qx, Qy,* and *Qz.* But each time a nova has been observed, astronomers seem to have preferred to describe its spectrum in detail without making use of these designations.

The individual differences among novae have apparently overshadowed their similarities, and while Dr. McLaughlin recognizes the striking nature of these peculiarities, he feels that the underlying similarity should be expressed in more concise form than is possible with detailed descriptions. In general, a nova exhibits successively four different sets of dark lines with associated bright lines or bands. These are the pre-maximum spectrum; the principal spectrum (resembling that of a supergiant star); the diffuse enhanced spectrum (strong hydrogen and ionized metallic lines); and the Orion spectrum (helium, ionized oxygen and nitrogen). A fifth stage is a survival of the Orion set, the dark lines of doubly ionized nitrogen and the hazy emission band "4640." After that, the bright nebular lines appear, and finally, they fade away (that is, the extensive cloud of matter erupted from the star thins out and disappears); the star itself is revealed, with a continuous spectrum and usually with weak bright lines. The interplay of these several sets of lines furnishes the criteria for distinguishing among the various stages of development.

Class *Q*0 is the early pre-maximum spectrum of weak absorption lines; *Q*1, the stronger absorption spectrum at maximum; *Q*2, the strong principal spectrum just after maximum, with bright bands of hydrogen and ionized iron; *Q*3, besides the principal spectrum, very strong diffuse enhanced dark lines and bright bands of hydrogen and ionized metals are present; *Q*4 is a transition to *Q*5, which is the Orion stage; *Q*6 is the 4640 stage, which continues to *Q*7, but the bright nebular lines due to forbidden transitions in doubly ionized oxygen are appearing, and all absorption lines have disappeared; *Q*8 has the nebular lines as strong as hydrogen, and the 4640 hazy band is gone; *Q*9 is the fully developed nebular spectrum, very similar to that of a planetary nebula; at *Q*9.5, the nova begins to show the continuous spectrum of the star itself.

The remaining star, after the nebular lines have completely faded away, is somewhat like a Wolf-Rayet star, and *Q*(*W*) is suggested by Dr. McLaughlin as the designation of its spectrum.

Atmosphere of 10 Lacertae

COUDE SPECTRA taken with the 100-inch telescope at Mount Wilson Observatory have been used by Dr. L. H. Aller, of Indiana University, to investigate the characteristics of the atmosphere of the hot star 10 Lacertae. The relative abundances of gases in this star turn out to be the same as in another early-type star, Tau Scorpii.

For every 2,000 atoms of hydrogen in the atmosphere of 10 Lacertae, there are 130 of helium, 0.2 of nitrogen, 0.2 of carbon, 0.8 of oxygen, 0.7 of neon, 0.07 of silicon, and 0.05 of magnesium. Dr. Aller called attention to the comparable amounts of neon and oxygen in these hot stars, and mentioned the case of Nova Persei, which exhibited strong neon lines shortly after maximum (see *Sky and Telescope,* May, 1946).

CORRECTION

In **Sky and Telescope** for May, 1946, page 9, the second paragraph of the report on "Atmospheric Nitrous Oxide" should begin as follows:

"The explanation proposed by Dr. Adel to the American Astronomical Society was made as a result of recent work by M. W. Kriegel, . . ."

The original version is incorrect, inasmuch as Dr. Adel himself, and not Mr. Kriegel, is the originator of the idea that escaping soil air may be a primary source of atmospheric nitrous oxide.

Navigation Notes

Institute of Navigation Meets

THE EASTERN REGION of the Institute of Navigation held a meeting at the Hotel Mayflower, Washington, D.C., on March 8th and 9th. Gordon A. Atwater, curator of the Hayden Planetarium and eastern vice-president of the institute, arranged the meeting and presided. Over 150 persons registered for the two-day session, at which 23 papers dealing with various aspects of surface and air navigation were presented. These papers will appear in **Navigation,** the journal of the institute, the first issue of which is in press. Major J. W. Calvert, AAF, is the editor, while Mrs. Elizabeth Sternberg Mulders, of the Mount Wilson Observatory staff, is chairman of the publication committee.

Guest speakers at the sessions were Major General Hugh J. Knerr, AAF, and Capt. J. P. Vest, USN. General Knerr stressed the importance of dependable air navigation and the need for continual development of new methods. In this period of rapid air travel, he observed, "we can get lost faster."

Comdr. G. L. Ottinger, U. S. Coast Guard, called the attention of surface navigators to loran, the new long range aid to navigation, which is available for use along the major commercial routes in the North Atlantic and Pacific oceans. Capt. M. H. Imlay, also of the Coast Guard, in discussing problems of air-sea rescue, pointed out that in a single year over 550 craft, primarily military aircraft, had been in trouble in the area included in the Eastern Sea Frontier, most cases occurring during foul weather. For surface and air craft to be of mutual assistance in such weather, first-class navigation is a prerequisite.

"American Merchant Marine Navigation" and "Design for Nautical Almanac" were titles of discussions by Col. G. W. Mixter. The first paper reported the methods which 100 merchant officers preferred to use when reducing celestial observations. **H. O. 214** was definitely the first choice, with **H. O. 211** second because of its light weight and small cost. A surprising number of older officers still preferred time sights. The new almanac design was proposed as intermediate between the format of the present **Nautical Almanac** and the **Air Almanac.** Col. Mixter reminded the audience that 10,000 merchant officers were navigating daily.

Two new instruments were then described, one the Durkee sextant discussed elsewhere on this page, and the other a device to provide azimuth information to men in small craft, such as life rafts. Known as the Kielhorn-Marean azimuth device, this simple plastic instrument can find azimuth to within two or three degrees.

A number of papers on air navigation considered possible commercial usage of war-developed instruments. Col. N. L. Winter, of Wright Field, pointed out that many of the new airborne radar sets present a picture of terrain out to ranges of 100 miles. For overwater flying this permits piloting on islands or landmarks near the route. Over land the intensity of the image varies with the nature of the soil, vegetation, and man-made objects. Experimentation continues on the best form of chart for use with this radar; detailed contour information, like that obtained from three-dimensional models, seems desirable.

Lt. Comdr. L. C. Read, USNR, and V. I. Weihe, of Wright Field, spoke about application of new devices to air traffic control. Loran has been used experimentally for instrument approaches, and Comdr. Read stressed the possibilities of using it for "stacking" aircraft over a field during instrument-approach conditions.

Three papers dealt with meteorology and aviation. "Single heading flights," described by Comdr. George Wheelwright, USNR, and flights on "pressure patterns," described by Comdr. W. J. Catlett, Jr., USN, both involve meteorological information and promise better dead reckoning. The automatic weather stations developed by the U. S. Weather Bureau were described by Louvan Wood; these units can be set up in isolated places in a short time and, unattended, will furnish a variety of weather data for periods of two to four months.

Lt. Comdr. J. C. Amick spoke on instruments needed in aircraft traveling between 400 miles per hour and the speed of sound. He stated that increased accuracy, simplification of presentation, and speed of reaction were among the primary requirements. The efforts by Bausch and Lomb to develop an octant with a satisfactory temperature-compensated bubble were related by Edward Flint, of that company. Success has been attained by using the differential thermal expansion of two metals to control the size of an overflow reservoir for the liquid in which the bubble is formed.

Problems of polar navigation were emphasized by Lt. Comdr. E. E. Packard, USNR. In a large region between central Canada and the geographical pole the magnetic compass is of no value, for either the horizontal force is too weak to control the compass or the variation is too large and rapidly changing to be applied during an extended flight. Contact flying is impractical, but a gyro heading-indicator helps maintain a fairly good course, especially if celestial azimuths are observed as a control on the gyro creep. Grid navigation with inverse-Mercator charts for polar regions helps overcome difficulties caused by the rapidly converging meridians.

FLETCHER G. WATSON

Spherical Sextant

"The lack of integrated semi-automatic navigation systems, capable of sustaining long range, all weather flight at speeds between 400 and 1,200 knots, even now blocks full exploration of operation properly belonging to the new air age. The principles embodied in the Durkee sextant may well lead to the perfection of such instruments."

These are the words of U. S. Navy Commander W. J. Catlett, Jr., in a foreword to an article in **The Ensign** for April, 1946, publication of the U. S. Power Squadrons. The article describes a sextant invented by W. B. Durkee, of the Boston Squadron, and is written by R. A. Norton. Publication office of **The Ensign** is 25 Lafayette St., Brooklyn 1, N. Y.

In its basic arrangement, the Durkee sextant employs a telescope oriented parallel with the earth's axis by a bubble level or crossed horizon mirrors. An "index" mirror set for declination sweeps the diurnal circle of the body chosen for observation; the necessary rotation of the telescope barrel measures meridian angle. When the star or other celestial body is at the intersection of the crosshairs in the telescope and the bubble or crossed horizons are also centered, time is marked and the local hour angle compared with the Greenwich hour angle to determine the longitude. In this case, the dead-reckoning latitude is used; in order to determine another point on the line of position, another latitude is assumed and the sighting process repeated. This method is similar to the old time-sight process, but no computation is required.

An ingenious arrangement is employed to determine azimuth if only a single position is used: a transparent vertical varicolored screen is rotated around the sighting mirror until the color of the image changes. Either azimuth or direction of the line of position may be read directly.

The spherical sextant being used by its inventor, W. B. Durkee. Engraving, courtesy "The Ensign."

The basic version of the Durkee sextant requires sighting only one celestial body at a time, thereby overcoming objections to other devices which require holding two or more stars and a bubble in the same

(Continued on page 22)

NEWS NOTES

By Dorrit Hoffleit

NEW ELEMENTS NAMED

Dr. Glenn T. Seaborg, one of the co-discoverers of elements 95 and 96, announced in an address before the American Chemical Society in April the naming of the new elements. Elements 92, 93, and 94 had been named after the planets Uranus, Neptune, and Pluto, thus having caught up with the outer limits of the known solar system. Dr. Seaborg therefore sought other precedents for the naming of his new elements.

The "planetary" electrons belonging to an atom roam in certain characteristic orbits. Element 95 is similar to europium, of atomic number 63, while element 96 is similar to gadolinium, element number 64. Hence Dr. Seaborg calls the new element 95 *americium* (amer-*iss*-ium), and he names element 96 *curium*. Gadolin was a student of the rare earths and, as is well known, Pierre and Marie Curie were students of the radioactive elements.

HIGH ALTITUDE OBSERVATORY

In 1940, Harvard College Observatory established a solar station at Climax, Colo., the result of the efforts of Dr. Donald H. Menzel. Studies made there of the solar corona and magnetic disturbances on the sun proved valuable during the war because they enabled predictions of radio blackouts, and hence assisted in attacks on the enemy while enemy detecting devices were necessarily inactivated.

During the past year or more, the station has been operated jointly by Harvard and the University of Colorado. Recently, incorporation papers have been drawn up establishing the High Altitude Observatory of Harvard University and the University of Colorado. This is the successor to Harvard's original Climax station; under the joint direction of the two universities new buildings and equipment are planned for a site on national forest land about five miles from the present station. There trees will give more protection from dust, which is more damaging in eclipseless solar corona work than in any other phase of observational astronomy. Construction will commence as soon as availability of materials and snow conditions on Fremont Pass permit.

The world's largest coronagraph will be the chief observing instrument in the new observatory. It is hoped that the equipment will include a new $14,000 filter designed by Dr. John W. Evans, of the University of Rochester, which will make possible direct photography of the solar corona. Besides the expansion of solar studies, the program may include meteor photography (for velocities), studies of the brightness of the night sky, physical conditions of the earth's upper atmosphere, cosmic rays, and perhaps even biological investigations of the behavior of organisms under high-altitude conditions.

Dr. Walter O. Roberts, who has been superintendent of the Climax station, will continue in that capacity under the new administration. A headquarters will be established at Boulder, home of the University of Colorado.

MEDAL TO ASTRONOMER

Nature reports that the Gold Medal of the Royal Astronomical Society has been awarded to Professor J. H. Oort, director of the Leiden Observatory. While Dr. B. Lindblad, of Stockholm Observatory, had first suggested the hypothesis of the rotation of the galaxy about a center near the center of the system of globular clusters, it was Professor Oort who provided the first direct observational evidence. "A series of brilliant investigations fully established the rotation of the galaxy, provided estimates of the distance of the centre of rotation, of the velocity of rotation at the sun's distance, and of the total mass of the system." Dr. Oort has been general secretary of the International Astronomical Union since 1935.

NEW GREENWICH SITE

Time magazine for April 29th carried a photograph of Hurstmonceux Castle in Sussex, England, the new site of Greenwich Observatory. The castle, where the Astronomer Royal will live, was built in 1446, more than 200 years before the observatory at Greenwich.

MERCURY STANDARD OF WAVE LENGTH

The best wave-length standard of the near future will no longer be the red cadmium line which has been standard since 1893, but a green line due to a mercury isotope transmuted from gold. Science Service reports on the work by Drs. Jacob H. Wiens and Luis Alvarez, who used the cyclotron of the University of California to bombard atoms of gold with neutrons. When the gold atoms capture neutrons they become radioactive, and after emitting electrons become mercury of atomic weight 198, with a purity better than one atom in a million. This purity is reflected in the sharpness and clarity of the spectrum line, which does not vary by more than one 50-billionth of an inch in wave length.

This mercury line is further superior to the cadmium standard because the mercury can be brought to incandescence at a much lower temperature — actually below freezing, whereas cadmium must be heated to 300° centigrade. Also, mercury atoms, being heavier, do not move about as fast when heated. Both the mass and the temperature of the atoms influence the sharpness of spectrum lines; needless to say, the sharper a line is, the more accurately it can be measured.

PEACEFUL V-2 ROCKETS

German V-2 rockets are being fired in New Mexico. Their warheads, which formerly contained the explosive charge, are now being equipped with apparatus for the measurement of cosmic ray intensities at altitudes as high as 100 miles above sea level.

B-29 bombers, also, are collaborating in cosmic ray studies — flying at altitudes of 35,000 feet between the northern United States and the magnetic equator. The range in latitude is important because of the variation of cosmic ray intensity with distance from the equator.

SOLAR CORONA EFFECTS

A Science Service release reports that A. H. Shapley, of the Carnegie Institution of Washington, and Dr. W. O. Roberts, of Harvard's coronagraph station at Climax, Colo., have found that magnetic disturbances on the earth occur when intense emission regions of the solar corona are situated in the eastern hemisphere of the visible solar disk. This finding is one result of a two-year study of variations in the corona as observed at Climax and compared with the records of the Carnegie Institution's Department of Terrestrial Magnetism. The two scientists reported their findings at a joint meeting of the International Scientific Radio Union and the American Institute of Radio Engineers, on May 3rd in Washington, D. C.

"The basic objective of the solar-terrestrial correlation is to improve techniques of short-term forecasts of the behavior of ionospheric layers for use in radio communications and allied problems. For the successful attainment of this objective the coronal data have definite usefulness," Mr. Shapley said. "A study of the effect of latitude distribution on the nature of the correlation is perhaps most important, inasmuch as the active solar regions encountered during the test period were predominantly in low latitude, belonging to the waning cycle, whereas regions of the new cycle, in high latitude, have since become more numerous."

Amateur Astronomers

Junior Astronomers Score in Science Talent Search

SIX OF THE 40 high school seniors who were invited to Washington, D. C., for the Science Talent Institute, March 1-5, 1946, were amateur astronomers. Though the ages of the 40 ranged from 15 to 18, at least two of those who have chosen astronomy for their careers are far in advance of their years in astronomical accomplishment. A special trip to the U. S. Naval Observatory was arranged one evening when they looked through the 26-inch refracting telescope.

Dr. Bart J. Bok, associate professor of astronomy at Harvard University, who spoke to the group and interviewed the amateur astronomers later, said of two of them, "As far as their knowledge of astronomy and their skill and experience with instruments are concerned, both are on the level of a good entering graduate student. I would have no hesitation in recommending either for a position as a scientific assistant at any observatory."

During the five-day stay of the winners in Washington, Westinghouse science scholarships of $400 each were awarded to Gordon Allen Newkirk, Jr., 17 years old, of West Orange High School, West Orange, N. J., and to Harold Zirin, 16, of Bassick High School, Bridgeport, Conn.

Alternate for a $400 Westinghouse science scholarship is Miss Elizabeth Roemer, 16, of Alameda High School, Alameda, Cal., who also aspires to a career in astronomy. Since last July she has observed sunspot numbers for the solar division of the A.A.V.S.O. Her daily reports have gone to the Department of Terrestrial Magnetism, Carnegie Institution of Washington, where they are used in making monthly calculations of sunspot numbers, upon which are based long-range predictions of short-wave radio frequencies. She is one of six women in the United States doing such observing. She wrote in her competition essay, "I have graphed the daily relative numbers (sunspots) and compared the results with charts of monthly averages for the last two 11-year cycles in an effort to determine whether there is a secondary sunspot period of variability. I hope to be able to make daily observations of sunspot numbers through at least one 11-year cycle to try to check on the possibility of a regular secondary variation." Miss Roemer will attend the University of California at Berkeley.

Mr. Newkirk has constructed a 6-inch, 78-inch focal length reflecting telescope and accessories for photographing the moon and other bright heavenly bodies. His plans are to make a stellar spectrograph. The college of his choice is Harvard.

Mr. Zirin built an 8-inch reflector and has been observing for some time for the American Association of Variable Star Observers. He plans improvements on his telescope such as a clock drive and a camera, and will begin work soon on a 10-inch mirror. He may attend Yale.

Other aspiring amateur astronomers in the group of 40 are: Kenneth Gordon Widing, 18, Washington High School, Brainerd, Minn.; Dorothy Jean Jackson, 16, South Charleston (W. Va.) High School; and John Charles Champeny, also 16, Wellington (Kans.) High School. Each was awarded a $100 Westinghouse science scholarship.

John C. Champeny demonstrates his reflecting telescope at the Science Talent Institute. Science Service photo.

The fifth annual science talent search for the Westinghouse science scholarships was sponsored by Science Clubs of America, administered by Science Service. About 16,000 high school seniors entered the competition. Honorable mention was awarded to 260, and 40 were invited to Washington for the five-day Science Talent Institute. The sixth annual search, now on, will culminate in March, 1947.

MARGARET E. PATTERSON
Secretary, Science Clubs of America

TACOMA AMATEURS RESUME ACTIVITIES

Meeting for the first time since December, 1942, the Tacoma group gathered on March 4th, the first Monday of the month, which is our regular meeting night. There was a good turnout of old members, and several prospective new ones. The past, present, and future of the club were discussed. Action was to be taken in April about a permanent meeting place. All persons interested in joining our group should communicate with the undersigned.

DOROTHY E. NICHOLSON
2816 No. Union Ave.
Tacoma 7, Wash.

THIS MONTH'S MEETINGS

Chicago: On June 11th, the Burnham Astronomical Society will meet at 8:00 p.m. in the Chicago Academy of Sciences Auditorium. "The Solar and Stellar Systems" will be discussed by John Sternig, director of science, public schools, Glencoe, Ill.

Cincinnati: The Cincinnati Astronomical Association will visit the Buffalo Ridge Road Observatory on Saturday, June 15th, and observe with the 8-inch refracting telescope there. By automobile take the Cincinnati-Louisville pike (U.S. 264) to Zion Road, thence to Buffalo Ridge Road.

Cleveland: Dr. Paul Herget, of the U. S. Naval Observatory, will address the Cleveland Astronomical Society on June 7th at 8:00 p.m. His subject is "Comets," and the meeting is held at the Warner and Swasey Observatory, East Cleveland.

Detroit: The meeting of the Detroit Astronomical Society on Sunday, June 9th, will be held at the Cranbrook Institute of Science. Dr. Robert T. Hatt, director, will conduct a tour of the institute and Stuart Perry, editor of the Adrian, Mich., *Telegram*, will give a talk on the meteorites to be found amongst the exhibits, most of which he found in Michigan and presented to the Cranbrook Institute.

Indianapolis: Russell Sullivan will speak on "Using a Telescope" at the June 2nd meeting of the Indiana Astronomical Society, at 2:15 p.m. in Odeon Hall, Pennsylvania and North Streets.

Madison, Wis.: A picnic will be the feature of the June 12th meeting of the Madison Astronomical Society at Washburn Observatory of the University of Wisconsin. Election of officers will also take place.

Pittsburgh: H. Malcolm Priest will give a lecture about setting circles at the June 14th meeting of the Amateur Astronomers Association of Pittsburgh. There will also be election of officers.

DETROIT CONVENTION — Program and R

THE PROGRAM. Given in outline last month, the program is here presented in its form as of May 8th. Undoubtedly, additions and changes will be made before the time of the convention.

Friday, July 5th

9:00 a.m. Registration of delegates (fee $1.00).

9:30 a.m. Welcome by Dr. Robert T. Hatt, director of Cranbrook Institute of Science, in the auditorium, followed by a tour of the institute. Inspection of amateur exhibits.

10:45 a.m. First convention session: 1. General talk by William Schultz, Jr., president, Detroit Astronomical Society. 2. Discussion of aims. 3. Organization of committees to report at later sessions. 4. "Organization Among Amateur Astronomers," Charles A. Federer, Jr.

12:30 p.m. Luncheon.

1:30 p.m. Leave for Lake Angelus.

2:00 p.m. Program at McMath-Hulbert Observatory, Lake Angelus. Three members of the staff will act as hosts, Dr. Orren C. Mohler, Dr. Leo Goldberg, and John T. Brodie. 1. Tour of the observatory with explanation of techniques. 2. Latest spectroheliokinematographic pictures, in the library.

5:00 p.m. Leave for Cranbrook.

6:15 p.m. Dinner.

7:45 p.m. Paricutin volcano color motion pictures as assembled for the National Archives, by Dr. Otto O. Fisher.

9:00 p.m. Outdoor observing with everyone's portables and the Cranbrook 6-inch refractor. If skies prove unfavorable, Paul W. Stevens, Rochester, N. Y., will show kodachrome movies of the 1945 total solar eclipse and will give a short talk on the Galilean satellites.

Saturday, July 6th

8:30 a.m. Breakfast.

9:30 a.m.—12 noon. Second convention session. 1. Amateur activities. 2. Color motion picture by the Amateur Astronomers Association of New York showing their telescope making, field trips, lectures, and eclipse expedition to Butte, Mont. 3. Reports by delegates on group activities (please send name, topic, and presentation time in advance to facilitate arranging this program). 4. Publicity work and methods; publicity materials on display.

12:30 p.m. Official banquet. Among the guest speakers will be Dr. and Mrs. Edward T. Boardman, Cranbrook Institute; Dr. W. Carl Rufus, University of Michigan; Dr. and Mrs. Mohler; Dr. Everett R. Phelps, Wayne University; Dr. Dean B. McLaughlin, University of Michigan; Dr. Goldberg; Mr. Schultz; Lloyd H. Sprinkle, president, Northwest Detroit Astronomical Society; William Edward Kapp, trustee of the Cranbrook Institute.

2:30 p.m. Group photograph.

3:00 p.m.—5:45 p.m. Third convention session. 1. Reports of committees. 2. Voting on organization. 3. Problems of future activities. 4. Selection of date and place for 1947 convention. 5. Award of prizes for exhibits.

6:15 p.m. Supper.

7:15 p.m. Leave for Ann Arbor. Open house at University of Michigan Observatory and Angell Hall. Hosts will be Dr. A. D. Maxwell, Dr. McLaughlin, Dr. Hazel M. Losh, Dr. Mohler, Robert M. Paige and Lyle R. Langdon. 1. 12-inch refractor. 2. 37-inch reflector—the actual process of taking a spectrogram of a star will be demonstrated, and measuring engines shown. 3. Seismographs. 4. 10-inch refractor at Angell Hall. 5. 15-inch refractor at Angell Hall.

11:00 p.m. Return to Cranbrook.

Sunday, July 7th

8:30 a.m. Breakfast. All baggage must be removed and rooms vacated by 9:30 a.m.

10:00 a.m. Fourth convention session. 1. "Aluminizing," Mr. Sprinkle. 2. Reports by telescope makers. 3. Demonstration of exhibit models. (Convention exhibits to be removed.)

12:30 p.m. Departure of delegates.

Who Is Coming. As the program shows, many professional astronomers will attend the convention and act as hosts. The local amateurs will, of course, turn out in force. From farther afield, by the beginning of May reservations were in from many individuals and groups as widely separated as Alabama, the District of Columbia, Illinois, Massachusetts, Missouri, New York, and Wisconsin.

How to Get Here. Refer to the map and other travel information in *Sky and Telescope,* May issue, for details on how to reach Cranbrook Institute of Science from Detroit. William C. Oberem, chairman of the transportation committee, reports that several railroad companies have offered their assistance in solving transportation problems for people coming from out of the state. The Union Pacific, the Missouri Pacific, and the Pennsylvania are among these. The Detroit and Cleveland Navigation Company has called attention to the excellent overnight service to Detroit from Buffalo and Cleveland.

Where to Stay. As outlined last month, rooms and meals will be furnished by the Cranbrook School, situated a few minutes' walk from the Institute of Science. The cost per person, from after breakfast Friday to after breakfast Sunday, is $10.00, including lodging. Reservations should be made not later than June 10th through the undersigned. If you have other plans for overnight accommodations, meals may be taken with the group at the school, but only by reservations made not later than June 15th. Meals at the Cranbrook School are sumptuous, but served promptly and only at the hours stated in the program.

Problems of National Organization. One of the primary purposes of the convention will be to consider problems of the organizing of amateurs and their societies on a nationwide basis. The Amateur Astronomers League of America, proposed by the Third National Convention, was never finally organized because of the war emergency. A more recent proposal for a national association of amateur astronomers has been made and worked on by a committee of the American Association of Variable Star Observers headed by Dr. Harlow Shapley, of Harvard College Observatory. On the program adequate time has been allowed for the discussion of this important development, and those with thoughts of national organization foremost in their minds should come prepared to take part in the proceedings.

(MRS.) MARGARET BACK
Convention committee chairman
46 Edgemere Road
Grosse Pointe Farms 30, Mich.

The Observatory of the University of Michigan at Ann Arbor, where open house will be held for the amateurs' convention on Saturday evening, July 6th.

Rules of Exhibit

THE EXHIBIT. As shown by exhibits at the three preceding national conventions, and by the experience of amateur groups generally, a very profitable exchange of ideas results from having collected in one place the work of a large number of persons all interested in the same hobby. Whether your exhibit is a lone-wolf job, or represents the work of a group, it is welcome at the coming convention. Amateurs who find that distance or some other factor prevents them from personally attending the convention may find the sending of an exhibit a satisfactory way to participate in this activity. Many varied entries should be forthcoming, inasmuch as there has been no exhibit since 1941.

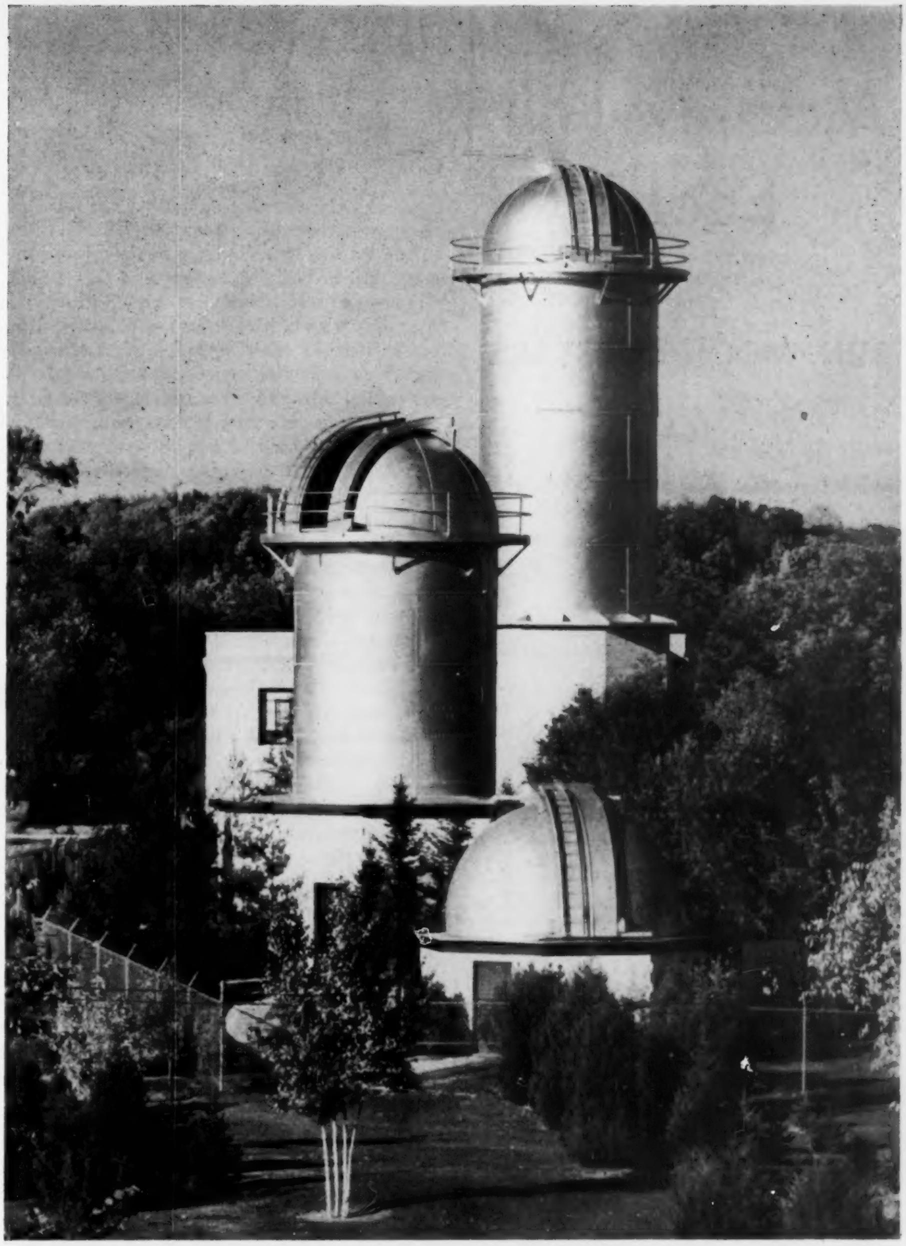
As announced last month, adequate space for proper display of entries of all kinds has been provided by the Cranbrook Institute of Science. Exhibits are to be divided into six classifications, as follows:

Class 1. Amateur-made telescopes.
Class 2. Photographs of amateur-made telescopes.
Class 3. Small scale models of amateur-made telescopes (existing or contemplated).
Class 4. Telescope parts and accessories, amateur made, including such items as eyepieces, mirrors, diagonals, finder scopes, spectroscopes, focusing devices, and so forth.
Class 5. Astronomical photographs taken with amateur telescopes.
Class 6. Miscellaneous.

Entry rules and cards will be sent to individuals and groups on request. For further information or entry blanks write to the exhibit chairman, at the address below.

Rules for submitting photographs — Classes 2 and 5. Photographs of amateur-made telescopes should be not less than 4" x 5" in size, mounted or unmounted (please do not send framed or glass-fronted pictures). Name and address of sender should be written on the back of each photograph. An additional sheet not larger than the photograph, attached with a paper clip (not pasted to the back of the photo), should contain the name and address of the maker, size and focal length of instrument, and a brief history, information as to cost and time required to make. An entry fee of 25¢ (stamps or coin) for each photograph has been set to cover prize awards. Postage must be prepaid. Return postage should be included if return of the photograph is requested; otherwise, the picture will be retained and displayed in some local astronomical museum, unless recovered by the exhibitor at the close of the convention.

Rules for submitting items—Classes 1, 3, 4, and 6. All packing, shipping, and delivery costs must be borne by the exhibitor. Return packing and shipping costs should be sent at the time exhibits are shipped to us. All entries are at the owner's risk; neither the Cranbrook Institute of Science, the Detroit Astronomical Society, nor the Northwest Detroit Astronomical Society will be responsible for loss or damage to property during transit, while on exhibition, or otherwise, but every effort will be made to protect the exhibits from loss or damage while in our possession. The valuation of each exhibit must be stated. An entry fee of 50¢ for each exhibit covers prize awards. When shipping unassembled telescopes or other equipment, each individual piece must bear a tag with the name and address of the exhibitor — this is necessary to avoid loss or mixup of parts.



The three "towers of the sun" of the McMath-Hulbert Observatory of the University of Michigan at Lake Angelus. Here the convention delegates will be guests on the afternoon of Friday, July 5th.

Exhibits can be accepted after June 20th, preferably should arrive about June 26th, and not later than July 2nd. If you plan to attend the convention and arrive by July 3rd, we will provide space for your exhibit. Whenever possible, a notice of your intention to bring an exhibit and the nature of the exhibit should reach us in advance. This is essential in planning the exhibition. You may enter as many items as you wish, but each must be accompanied by the proper entry fee.

All exhibits sent by express should be addressed to: *Cranbrook Institute of Science, Birmingham, Mich.* Exhibits shipped by mail or parcel post should be addressed: *Cranbrook Institute of Science, Bloomfield Hills, Mich.* All exhibits must be distinctly marked, "For Exhibition at National Astronomical Convention."

An impartial board of judges will be selected to award the prizes. Their decisions will be considered final.

L. H. SPRINKLE, exhibit chairman
19323 Hillcrest Blvd.
Farmington, Mich.

BOOKS AND THE SKY

ASTRONOMY
What Everyone Should Know

John Stuart Allen. Bobbs-Merrill Company, Indianapolis, 1945. 199 pages. $2.50.

MANY of the visitors to Chabot Observatory ask for a book on astronomy that is easy to understand but which is not written primarily for children. I was very much interested in reviewing this book because it is just the kind of book that a person visiting an astronomical observatory for the first time wants. Dr. Allen has an interesting manner of writing, and with the help of his cartoon and photographic illustrations the subject is made very real. A good introduction to constellations is given by taking up those of the zodiac first. The intention is to get the reader to know the constellations in that region of the sky well so that he can easily pick out the planets. It is very useful to have the pronunciation of the constellation names above each description because the ordinary reader does not have any idea as to how to pronounce these complicated and unfamiliar words. This chapter is very well presented.

The first 100 pages deal with objects which can be seen without a telescope; then reflecting and refracting telescopes are described so that things which cannot be seen otherwise may be introduced. The telescope mounting description is very short, meager, and limited to the equatorial mounting only. There is but a brief reference to the spectroscope, indicating that it would be too complicated to explain in such a simple book. In other words, this book tells more what astronomers have discovered, not how they accomplished these things.

On page 25, Dr. Allen says, "In time we imagine that all the known elements will be found in the sun." It would have been better simply to give the two reasons we are unable to find some two dozen elements in the sun. The first is that we see only the solar atmosphere, which is made of the lighter elements. It is the heavier ones we do not detect in abundance, and they might well be mostly in the solar interior. Second, some elements give off light of such short wave lengths that it cannot penetrate the earth's atmosphere. We may never actually find these elements in the sun even though we believe them to be there.

I am glad to see that the author mentions and talks about Epsilon Aurigae as having as a component one of the largest stars known. Many readers want to know which is the biggest star and where it can be found in the sky. Also, many more think the sun is the largest object in the sky, and it is good to show that there are stars larger than the sun.

On page 41, it should be stated that meteors, not the moon, are the closest astronomical objects to the earth. The oddities of the moons of Mars might have been further described on page 43. To most laymen, this is very interesting, since we have only one satellite for the earth.

The book is made up of seven parts: The Sun's Family, Constellations, Telescopes, The Moon, "Shooting Stars," Real Stars, and Skyrocketing Through Space. The last chapter is an almost necessary conclusion to this type of book, because people at the present time think in terms of rocket ships when they think of astronomy, so that it is wise to show them the complications which are involved in "Skyrocketing Through Space."

I shall certainly recommend this book to the many interested visitors who come to Chabot Observatory.

HELEN PETTIT
Chabot Observatory

ONE WORLD OR NONE

Various authors. McGraw-Hill Book Company, Inc., New York, 1946. 79 pages, paper bound. $1.00.

THE MOST DIFFICULT TASK of a reviewer is to review a book which should be read by everyone. **One World or None** is such a book. It should become a controversial publication about which one believes either that "The Scientists Are Acting Like Children" (to quote a recent columnist), or that "Survival Is at Stake" (to quote the last chapter of the

book). It is hard to see how one can take a middle ground.

The authors are among the foremost scientists in the country; some of them have much to say. To attract the casual reader to the book, a "come-on" first chapter describes an imaginary atomic bomb dropped on New York City. Having made this bow to sensationalism, the book gets down to business, first by descriptions of the background of fission processes, by Harlow Shapley, Eugene Wigner, and Gale Young. By the end of Chapter 5 (J. R. Oppenheimer on The New Weapon), the reader is either convinced or is trying to hide behind, "I hope I don't understand this correctly."

General of the Army H. H. Arnold writes Chapter 6 as "his last official public statement as head of the Air Forces." He tells in dollars and cents what the scientists have said with their explanations: atomic warfare is a simple, cheap, and devastatingly efficient method of blotting out life by the tens of thousands. Arnold shows statistically, followed by some chapters by others showing scientifically, that there is no defense against atomic warfare.

The last four chapters are attempts by as many authors to analyze the problem in hopes of arriving at some politically feasible method to prevent exploitation of atomic power for world conquest. It is these four chapters which those who believe "scientists are acting like children" will seize upon to hold up for ridicule. The authors of these chapters offer no real solution and oversimplify the problem sufficiently so that the professional statesman-politician will cry "unrealistic." One should be careful to note, however, that those who criticize have no solution either.

The book attempts to bring before the public the facts about the atomic bomb which make it a terribly unique problem in the political control of scientific knowledge. In this, the reviewer believes, the authors have succeeded admirably. It is not a carefully written, unified, or even self-consistent book. Rather it is a collection of articles by those best equipped to discuss special problems authoritatively, without too much relation to what the other authors have written. This does not detract from the value of the presentation, but perhaps enhances it since the reader has no feeling that the editors picked these particular authors because they would present a unified point of view.

One World or None, which presents the problem of the atomic bomb in the most authoritative and non-technical manner, is put together with the expressed purpose of stirring the reader into consciousness of the political problems posed by the discovery of how to release atomic energy. This type of politico-scientific writing is a new departure in journalism, and one which should be fostered. May I reiterate: this book should be read by everyone.

SANBORN C. BROWN
Massachusetts Institute of Technology

NEW BOOKS RECEIVED

ASTRONOMY, *John C. Duncan*, 4th edition, 1946, *Harper*. 500 pages. $4.50.

One of the standard American college textbooks appears in a fourth edition, 20 years after its first publication. There are 318 figures, including diagrams and halftone pictures.

In Focus

AGAIN THIS MONTH the portion of the moon shown on the back cover is a very crowded region, with numerous and varied features. Some of the formations shown on the key chart also were noted on Charts I, II, and IV. All of the 84 features named in this section of the moon are identified. Spellings follow the International Astronomical Union's **Named Lunar Formations,** by Blagg and Mueller, and bibliographical information is from the British Astronomical Association publication, **Who's Who in the Moon.**

A glance at the chart reveals the names of many astronomers whose chief accomplishments are familiar to all. Among these are S. W. **Burnham** and **E. Pickering,** observers of note; **D'Arrest, Halley,** and **Tempel,** of comet fame; John **Dollond** and G. W. **Ritchey,** famous opticians, the first well known for perfecting the achromatic lens in the 18th century, and the second for his work on the two largest Mount Wilson reflectors in the 20th century; and Jeremiah **Horrocks,** the Englishman who lived only 22 years, and whose name is associated with the transit of Venus in 1639.

Abulfeda. This ring plain has walls 10,000 feet high; note the bright patches in its interior. It is about 40 miles in diameter.

Albategnius. Muhammed ben Geber al Batani, an Arab astronomer of the late ninth century, introduced the use of sines in trigonometry, and discovered the variation in the obliquity of the ecliptic. This large walled plain is 80 miles across; it has a large central peak, and many "saucer-like depressions" which Goodacre says are visible only when near the terminator (as in this photograph). **Klein** is the crater in its eastern wall.

Ariadaeus, and the **Ariadaeus Cleft.** The small crater of this name is near the end of the famous cleft, which extends for about 140 miles. When the moon is full, the cleft cannot be seen.

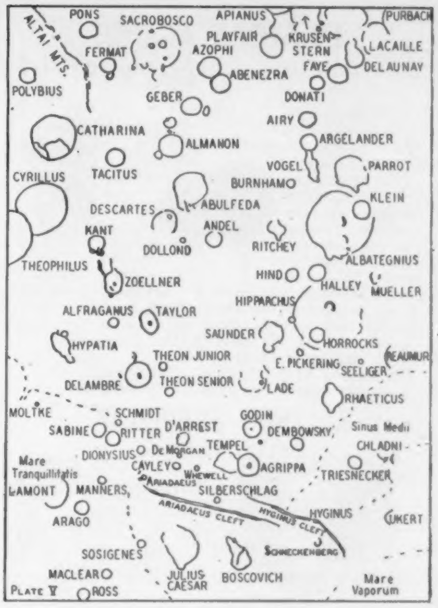
Delambre. This 30-mile crater is so deep that some of its walls reach 14,000 feet above its floor. There is a mountain outside its southern rim, a ridge to the west, and several craters and a peak in its interior. Named for a French astronomer of the 18th century who wrote a five-volume history of astronomy.

Godin. Note how the rays of sunlight are illuminating the central peak.

Hipparchus. An irregular walled enclosure over 100 miles in diameter, with much detail in and around it, including the fine crater **Horrocks.**

Hyginus Cleft. There are numerous craterlike markings along most of the length of this remarkable formation, which is seen easily with small telescopes. **Hyginus** is just at a sharp bend in the cleft. Caius Julius Hyginus, born in Spain, lived in the first century, and is believed to be the author of **Poeticon Astronomicon.**

Hypatia. Named after the daughter of Theon of Alexandria (see Theon Junior). She was a noted Alexandrian mathematician, about whom Charles Kingsley wrote in his novel of the same name.



Taylor. Brook Taylor was an English mathematician at the beginning of the 18th century; his name is connected with Taylor's theorem. On the moon, this is a somewhat oval ring plain, with a central peak.

Theon Junior and **Theon Senior.** These craters are very similar in appearance and size (about 11 miles in diameter). They were named by Riccioli for Theon of Alexandria (c. 380 A.D.) and Theon of Smyrna (c. 100 A.D.), both astronomers of only moderate note. Theon of Alexandria was the father of Hypatia (which see).

GLEANINGS FOR A. T. M.s

Wrinkles from Here and There

CYRUS F. FERNALD, of Wilton, Me., well-known observer of variable stars, writes as follows:

Recently, I have added three items which are decided improvements to my observing equipment:

1. For reading setting circles, I am now using one of those "grain of wheat" electronic lights, instead of a single-cell flashlight with red paper over the bulb. With a shield over the bulb the glow of the light is just enough for reading the circles. This can be plugged into the regular electric power that I have at the telescope.

The "grain of wheat" is called a "Robolight," rated at 1/25 of a watt and made by the Universal Light Company. This bulb gives a dim reddish glow, so a colored paper over it is not necessary.

2. For general variable star work I am using one of the focusing eyepieces recently advertised in **Sky and Telescope.** While the star images are not uniform over the whole field (the eyepiece evidently was designed for a special instrument, and so is not correct for mine), they are not off enough to bother seriously, and the enormous field and great light grasp give the eyepiece considerable advantage over any others that I have, for this special work.

3. For solar observing I made a polaroid filter to replace the various dark-glass combinations I was using for the final toning down of the sun's glare. The variable-density feature of this filter (crossed polaroids) is a great improvement. I find further that now I have something that will work wonders on the moon, when the latter would otherwise be much too bright for comfortable observing. Normally, of course, there is only a brief period each evening at dusk when the moon can be observed in any comfort, but with this polaroid filter any phase can be satisfactorily studied at any time, at least as far as the problem of too much light is concerned.

Charles M. Paulus, Sinking Spring, Pa., calls to our attention the following quotation from Webb's **1001 Celestial Wonders.**

"Though telescopic instruments are of comparatively recent invention, lenses themselves are known to be very ancient. Sir Henry Layard discovered in the ruins of Nimrud (1500 B.C.) a crystal lens used as a magnifier by the skilled carvers of cuneiform inscriptions on signet-cylinders of the early kings of Ur, 'City of the Moon.'"

For amateurs who like to silver their own mirrors instead of having them aluminized, a little honey in the solution will slow down the rate of deposition, thereby keeping it under better control. This is especially desirable in cases of partially silvered surfaces, which are occasionally needed for special purposes.

Some time ago, in the **Journal** of the Royal Astronomical Society of Canada, E. K. White, of Chapman Camp, B. C., described experiments with an electric fan forcing a current of air into the metal tube of a Newtonian reflector. He points out that in the damp climate of most of southern British Columbia, a skeleton tube for his 9-inch reflector of 100 inches focal length would be unsuitable. The closed tube protects the mirror from the elements and prevents trouble from stray light.

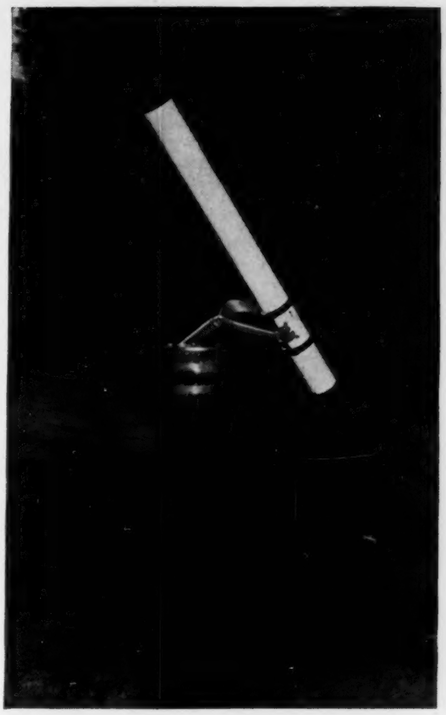
Air currents within a reflector tube have often been blamed for poor seeing, especially in rapidly changing temperature conditions. Mr. White based his experi-

ments with the fan on its use by W. H. Pickering, who is well known for his observations of the moon and planets. Pickering claimed greatly improved seeing when the fan kept outside air moving into the tube. In the present experiments, however, images were steadier but no more detail could be seen on the moon or the planets, and double stars were no more readily resolved. Mr. White concluded his report:

"From results so far obtained, with the exception of rare nights when seeing is quite good, the use of a fan is not considered worth while as a measure to improve definition."

An interesting back-yard equatorial mounting for a small refractor is reported by A. T. Ward, of Riverside, Cal. As the accompanying picture shows, a telephone pole is erected with its upper end secured with metal bands (nailed together). A base plate is perforated to receive the polar-axis support — a hollow tube or pipe into which the yoke stem on the telescope makes a sliding fit. The polar-axis support need not be angled off at its lower end, as space for it can be cut out of the top of the telephone pole. The 4″ lag screws which hold the plate to the pole pass through four slots to allow polar alignment (azimuth adjustment). Mr. Ward writes further:

"This equatorial mounting is for my 80 mm. Bausch and Lomb refractor. The four lag screws, 3/8″ x 4″, allow accurate



Mr. Ward's simple equatorial mounting, designed for quick installation of a small refractor. Photo by Bert Eby.

leveling. The yoke stem, with its sliding fit, is quite steady, and allows keeping the image in the field with up to 150x for an hour or more without further hunting. It is practical for about 20° north and

south of the ecliptic, where possibly 75 per cent of the amateur's attractions are located.

"I moved the saddle about eight inches toward the eyepiece end for lateral balance of the telescope tube, and I have shaped bearings, as well as butterfly nuts, on the trunnions. A friend 'put me wise' to the telephone pole base, sunk about three feet in the ground. I recommend this simple, cheap, sturdy mount as a satisfying and sufficient implement for strictly amateur sky observation."

R. A. Bell, Port Clinton, Ohio, reports that cellophane placed upon a mirror when making a pitch lap works very satisfactorily. A sheet of cellophane (preferably colored, for visibility) is placed on the mirror and the pitch poured onto it. It peels off easily, and any small wrinkles near the edge of the lap, due to the concavity of the mirror, readily press or polish out.

From Bertram C. Felsburg, of Frackville, Pa., we hear: "I thought that for a light mount for a small portable 'scope, one could use an ordinary transit tripod—the mount being composed of two coaster-brake axles (as used on the rear wheels of bicycles) one set at an approximate angle of 45° and the other set perpendicular thereto."

SKY-GAZERS EXCHANGE

Classified advertisements are accepted for this column at 40 cents a line per insertion, six words to the line. Minimum ad is three lines. Remittance must accompany orders. Address Ad Dept., Sky and Telescope, Harvard Observatory, Cambridge 38, Mass.

FOR SALE: 3″ astronomical telescope. Mogey make. 45″ F.L. Fork type altazimuth mount. Wooden tripod. Dew cap, dust cap. Rack and pinion focus. Five astronomical eyepieces: 45x, 90x, 135x, 180x, 225x. Star diagonal, sun cap, eyepiece box. All in perfect condition. Price $245.00. Robert Doubleday, 227 Midland Ave., East Orange, N. J.

WANTED: Reflecting telescope, about 6 or 8 inches or mirror alone. M. Fiske, 137 Ninth Ave., New York, N. Y.

FOR SALE: 8″ unaluminized mirror guaranteed perfect parabola, $55.00. D. J. Sieber, 3811 McClure Ave., N. S., Pittsburgh, Pa., Ju-2263W.

FOR SALE: Rapid rectilinear photo lenses, hi-speed, 4 element, in barrel mounts. Suitable meteor, celestial photography. Four of each: F3.8, f.l. 3.8″, for 2¼ x 3¼ plate, $7.50 each. F3.8, f.l. 6.25″, for 4 x 5 plate, $12.50 each. C. Naylor, 903 W. Airy St., Norristown, Pa.

SELLING my 5½ x 88″ refractor in 8¼″ monel tube. Excellent condition. A. Hegel, Indio, Cal.

FOR SALE: One 10½″ diam. 1¾″ thick optical flat, fuzed quartz with National Bureau of Standards certificate. Surface new and better than .000001″ flat. Make offer. Harry Zerbo, 17414 Stout, Detroit 19, Mich.

FOR SALE: Numerous Fitz lenses, etc., 2″ to 10″, finished and unfinished, at greatly reduced prices. Louise Fitz Howell, Peconic, Suffolk Co., N. Y.

WANT perfect 4″ f/12 to f/16 mirror and 4″ or 6″ RFT mirror. W. Williams, CMA, Culver, Ind.

FOR SALE: 12 power "Prismen-Glaser" binoculars. Professionally made, complete with new heavy leather case. Perfect condition. $200.00. And two 8″ aluminized parabolic mirrors of 70″ focal length, complete with cells. Professionally made. $50.00 each. A. J. Oliver, 1001 Russia Ave., San Francisco, Cal.

FOR SALE: 24″ pyrex mirror blank, all edged and partly rough ground. Over 150 hours work already put into mirror. A blank of the same kind, in the rough, now costs $450.00. Will sacrifice for $500.00 and include 18″ diam. x 1½″ tool. Mirror blank is perfect. It had a 3-month annealing period. R. W. Sandberg, 11 Ericsson Road, Cabin John, Md.

Planetarium Notes

ADLER PLANETARIUM

900 E. Achsah Bond Drive, Chicago 5, Ill., Wabash 1428

SCHEDULE: Tuesdays through Saturdays, 11 a.m. and 3 p.m.; Sundays, 2:30 and 3:30 p.m.; building closed Mondays.

STAFF: *Director*, Wagner Schlesinger. *Other lecturer:* Harry S. Everett.

June: STEERING BY THE STARS. The principles underlying the modern practice of navigation and the determination of time are explained in simple terms for the layman.

July: STARS OF SUMMER.

BUHL PLANETARIUM

Federal and West Ohio Sts., Pittsburgh 12, Pa., Fairfax 4300

SCHEDULE: Mondays through Saturdays, 3 and 8:30 p.m.; Sundays and holidays, 3, 4, and 8:30 p.m.

STAFF: *Director*, Arthur L. Draper. *Other lecturers:* Nicholas E. Wagman, J. Frederick Kunze.

June: PAGEANT OF THE HEAVENS. The beautiful pageant of the summer stars, with simple methods of recognizing the constellations, complete with star stories and the old constellation pictures.

July: THE END OF THE WORLD.

FELS PLANETARIUM

20th St. at Benjamin Franklin Parkway, Philadelphia 3, Pa., Rittenhouse 3050

SCHEDULE: 3 and 8:30 p.m. daily; also 4 p.m. on Saturdays, Sundays, and holidays. 11 a.m. Saturdays, Children's Hour (adults admitted).

STAFF: *Director*, Roy K. Marshall. *Other lecturers:* I. M. Levitt, William L. Fisher, Armand N. Spitz, Robert W. Neathery.

June: CLOCKS AND CALENDARS. Astronomy contributes to civilization by providing accurate standards of time and proper regulation of man's calendars.

July: UNDER SUMMER SKIES.

GRIFFITH PLANETARIUM

P. O. Box 9866, Los Feliz Station, Los Angeles 27, Cal., Olympia 1191

SCHEDULE: Friday and Saturday, 3 and 8:30 p.m.; Sunday at 3, 4:15, and 8:30 p.m.

STAFF: *Director*, Dinsmore Alter (on military leave). *Acting Director*, C. H. Cleminshaw. *Other lecturer:* George W. Bunton.

June: REASONS FOR THE SEASONS. In this demonstration, the yearly variation in the sun's altitude and in the hours of sunshine are shown in both Northern and Southern hemispheres, at various latitudes.

July: COMETS AND METEORS.

HAYDEN PLANETARIUM

81st St. and Central Park West, New York 24, N. Y., Endicott 2-8500

SCHEDULE: Mondays through Fridays, 2, 3:30, and 8:30 p.m.; Saturdays, 11 a.m., 2, 3, 4, 5, and 8:30 p.m.: Sundays and holidays, 2, 3, 4, 5, and 8:30 p.m.

STAFF: *Honorary Curator*, Clyde Fisher. *Chairman and Curator*, Gordon A. Atwater. *Other lecturers:* Robert R. Coles, Catharine E. Barry, Shirley I. Gale, Edward H. Preston.

June: SKY FANTASIA. The mysteries of time and space suggest strange imaginings to one familiar with the secrets of the universe, as revealed in the planetarium universe this month.

July: BIRTH OF THE SOLAR SYSTEM.

UNUSUAL WAR BARGAINS in LENSES and PRISMS

NOW! MAKE YOUR OWN BINOCULARS!

Sorry! No more machined sets of 7X, 50 Binocular Metal Parts. We do have unmachined left and right body and cover plate castings . . . but no other parts.
Stock #820-Y .... **$2.50 Postpaid**

Complete Set of LENSES and PRISMS from Navy's 7X, 50 Model
SAVE UP TO $150.00!

Here's an unusual opportunity to secure a fine set of Binoculars . . . at a tremendous saving of money. Build them yourself with all of the very same optics contained in the Navy's 7 Power Glasses . . . the Binoculars which received such wide acclaim during the war. If, however, you wish to construct a Monocular (½ a Binocular) you may do so. Monocular Sets comprise ½ quantities of the same optics required for the Binocular. The full Binocular Set comprises the following:- 2 Cemented Achromatic Eye Piece Lenses, 17.5 mms. diam.; 2 Eye Field Lenses; 4 Porro Prisms; 2 Cemented Achromatic Objective Lenses, diam. 52 mms. All Lenses have the new low reflection coating. Complete assembly directions included.

Stock #5102-Y
Near Perfect Binocular Set **$25.00 Postpaid**

Stock #5103-Y
Near Perfect Monocular Set **$12.50 Postpaid**

SPECIALS IN LENS SETS

Set No. 1-Y — **"Our Advertising Special" — 15 lenses for $1.60 Postpaid,** plus 10-page idea booklet. For copying, ULTRA CLOSE-UP SHOTS macro-photography, experimental optics, magnifying and for making a two power f/16 Telephoto Lens, "Dummy Camera," Kodachrome Viewer, DETACHABLE REFLEX VIEW-FINDER for 35 mm. cameras, stereoscopic viewer, ground glass and enlarging focusing aids, TELESCOPES, low power Microscopes and for many other uses.

NEW 50-PAGE IDEA BOOK "FUN WITH CHIPPED EDGE LENSES"
Contains wide variety of projects and fully covers the fascinating uses of all Lenses in sets listed above . . . only **$1.00 Postpaid.**

RETICLE SET—5 assorted, engraved reticles from U. S. Gunsights. **Stock No. 2035-Y..$1.00 Postpaid**

OPTICS FROM 4-POWER PANORAMIC TELESCOPE
Excellent condition. Consists of Objective Prism, Dove Prism, Achromatic Objective Lens, Amici Roof Prism, Eye Lens Set (. . . a $60.00 value).
Stock No. 5016-Y .... **$6.00 Postpaid**

35 MM. KODACHROME PROJECTING LENS SET—Consists of Achromatic Lens for projecting, plus a Condensing Lens and piece of Heat Absorbing Glass with directions.
Stock No. 4025-Y .... **$1.95 Postpaid**

35 MM. KODACHROME PROJECTING LENS SET—Consists of 2 Achromatic Lenses for projecting, plus 2 Condensing Lenses and piece of Heat Absorbing Glass with directions.
Stock No. 4029-Y .... **$3.10 Postpaid**

SPECTROSCOPE SETS

These sets contain all Lenses and Prisms you need to make a Spectroscope plus FREE 15-page Instruction Booklet.

Stock No. 1500-Y—Hand Type Spectroscope, **$3.45 Postpaid**

Stock No. 1501-Y—Laboratory Type Spectroscope .... **$6.50 Postpaid**

ALL THE LENSES YOU NEED TO MAKE YOUR OWN TELESCOPE!

ALL ARE ACHROMATIC LENSES

GALILEAN TYPE — Simplest to Make but has Narrow Field of View.

Stock No. 5004-Y—Small 2 Power Pocket Scope ....**$1.00 Postpaid**

Stock No. 5018-Y—4 Power Telescope, **$1.25 Postpaid**

PRISM TELESCOPES—Use Prism instead of Lenses to Erect Image. Have wide field of view.

Stock No. 5012-Y—20 Power Telescope, **$7.25 Postpaid**

ACHROMATIC LENSES

Stock No.	Dia. in mms.	F.L. in mms.	Price
6158-Y*	18	80	$1.00
6162-Y	25	122	1.25
6164-Y*	26	104	.80
6166-Y	29	54	1.25
6168-Y	29	76	1.25
6171-Y	32	171	1.00
6173-Y*	34	65	1.00
6176-Y*	38	131	1.00
6177-Y*	39	63	1.10
6178-Y*	45	189	1.50
6179-Y*	46	78	1.25
6182-Y	27	51	1.25
6183-Y	44	189	2.50

*ASTERISKED ITEMS are uncemented, but FREE cement and Directions included with uncemented sets.

USES:—Use these Lenses for making Projecting Lenses, Low Power Microscope Objectives, corrected Magnifiers, substitute enlarging Lenses, Eye-Piece Lenses, Macro-photography, Gadgets, Optical Instruments, etc., etc.

MOUNTED PROJECTION LENS
A mounted f 2.1; 3.5 inch F.L. Projection Lens mfgd. on a Navy contract to be used on a 35 mm. Projector. Low reflection coated. Perfect condition. Black finish threaded at rear end. Outside diam. approx. 2 inches.
Stock #4031-Y .... **$12.00 Postpaid**

POLARIZING FILTER—Diam. 73 mm. Perfect condition.
Stock #637-Y .... **$3.00 Postpaid**

GIANT SIZE RED AND AMBER FILTERS
Filter material is cemented between glass. All ¾" thick.

Stock No.	Color	Diam.	Price
706-Y	Red	7-7/8"	$4.00
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624-Y	Neutral Ray Filter size 4¾" x 2½"	.25
3022-Y	Round Wedge 65 mm. diam. ..	5.00 each
16-Y	Level Vial, 48 mm. long	.20 each
1040-Y	6 Power Magnifier—diam. 25 mm.	.25 each
2043-Y	Standard Crossline Reticle—diam. 29 mm.	.50 each
1034-Y	Burning Glass Lens	.25 each
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OBSERVER'S PAGE

Greenwich civil time is used unless otherwise noted.

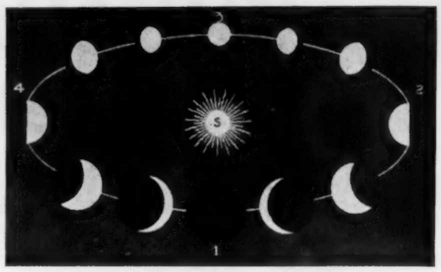
The Visibility of the Planets

FIVE NAKED-EYE PLANETS are within 90 degrees of right ascension a short time after sunset during the latter half of June. Mercury is nearest the western horizon; above it in order are Saturn, Venus, Mars, and near the meridian, Jupiter. On the 24th, Mercury passes Saturn, making the latter closest to the horizon. Neptune and Pluto are included in this quarter of the sky as well. Before June 8th, Uranus is also between the sun and Jupiter, but too near the sun to be seen.

This array of planets suggests an interesting program for observing. Try following the naked-eye planets, the moon, and the brighter stars as they near or leave conjunction with the sun. The most advantageous observing instrument is a pair of binoculars or good field glasses. A telescope is superior only if it has accurate setting circles and is used when the sun is high in the sky.

There are a number of factors which determine visibility. They are principally the inclination of the ecliptic to the horizon, the body's relation to the sun along the ecliptic, its own inclination, its apparent magnitude; this last is determined by the distance of the planet from the sun and from the earth, by its albedo or reflecting power, and by the portion of its illuminated area which is visible from the earth. Of course, the darkness of the sky plays an important part, as does the altitude of the object above the horizon. Obviously, eastern and western horizons free from obstruction and haze are a necessity.

Let us consider Mercury first. As this planet is inside the earth's orbit there are two types of conjunctions with the sun: superior on the far side, inferior conjunction when Mercury is between the earth and the sun. Unlike Venus (see the graph), the best general time to look for Mercury is between superior conjunction and greatest elongation, for the planet is brightest during that period. The full phase occurs when the planet has its least apparent size, but not as much light comes to us from the crescent phases which occur when the planet is nearer to the earth. Consequently, at eastern (evening) elongations look about a week or more before greatest distance from the sun best to view this elusive planet. In the morning, watch for Mercury after it passes elongation.

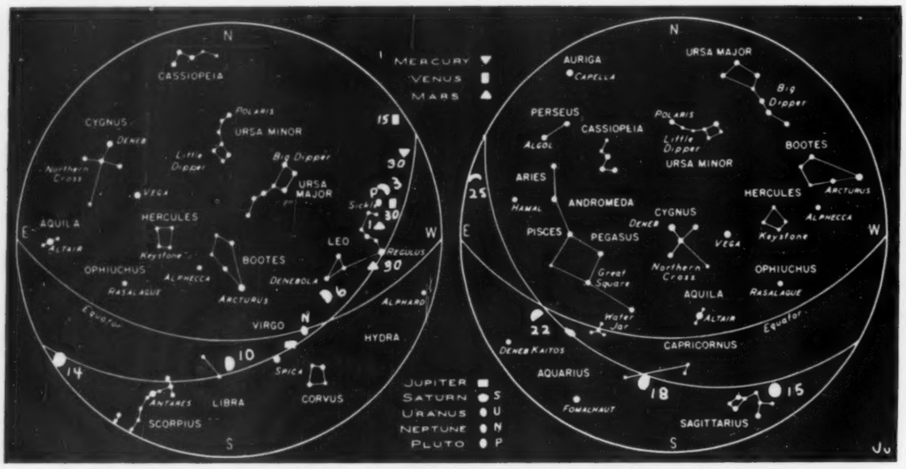


Mercury's apparent size and phases as seen from the earth. Position 1 is inferior conjunction; 2 is western elongation; 3 is superior conjunction; 4 is eastern elongation (evening sky).

The graph of Mercury's magnitude variations shows the curve for the July elongation this year. Of course, near superior conjunction on May 31st, the planet is not visible, even though it is of magnitude −1.9. Notice how the decrease in brightness becomes more rapid after elongation, so the planet is fainter than the 1st magnitude two or more weeks before inferior conjunction, and is lost to view.

Mercury's orbit has a large eccentricity, therefore at times it may be 15 million miles closer to the sun than at other

THE MOON AND PLANETS IN THE EVENING AND MORNING SKIES



In mid-northern latitudes, the sky appears as at the right at 3:30 a.m. local time on the 7th of the month, and at 2:30 a.m. on the 23rd. At the left is the sky for 9:30 p.m. on the 7th and 8:30 p.m. on the 23rd. The moon is shown for certain dates by symbols which give roughly its phase. Each planet has a special symbol, and is located for the middle of the month, unless otherwise marked. The sun is not shown, although at times it may be above the indicated horizon. Only the brightest stars are included, and the more conspicuous constellations.

Mercury can be seen in the evening sky from about June 12th, when it is 15° from the sun, until mid-July, but its magnitude steadily decreases from −0.9 on the 12th.

Venus remains prominent after sunset; early in the month it is below Castor and Pollux in Gemini. On the 1st, the moon is just north of the planet at sunset (see occultations). By the end of June, Venus moves into Cancer. Its magnitude is −3.4.

Earth passes heliocentric longitude 270° June 22nd, at 0:45 (evening of June 21st in North America). Summer begins in the Northern Hemisphere, winter in the Southern.

Mars passes ¾° north of Regulus in Leo on June 18th. The planet is of magnitude +1.6 and getting fainter. By the end of the month it sets about three hours after sunset.

Jupiter ceases retrograde motion on June 15th and commences to move east, but it appears practically stationary among the stars all month. Jupiter transits about sunset.

Saturn is rapidly disappearing in the evening twilight, but with slight optical aid it should be visible until July 1st, three weeks before its conjunction with the sun. Venus passes 1° 42′ north of Saturn on June 12th. On the 24th Mercury passes 1½° north of Saturn.

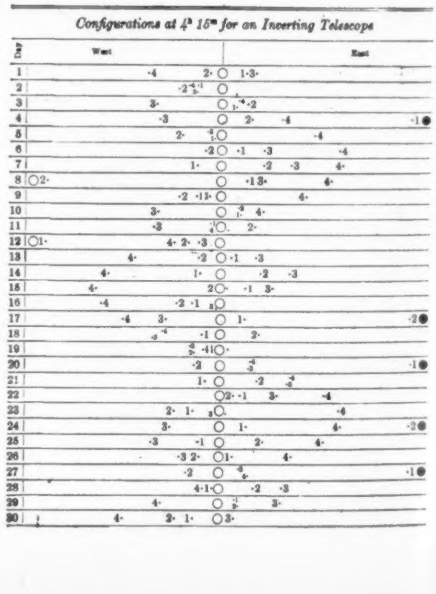
Uranus is in conjunction with the sun on June 9th.

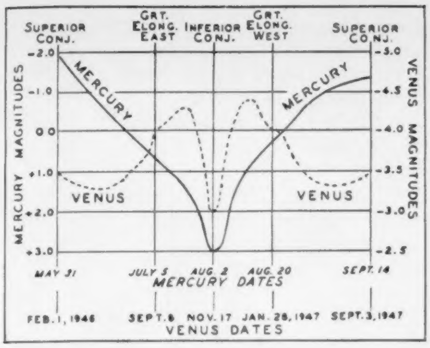
Neptune can be seen in a small telescope before midnight, its position on the 15th being $12^h\ 23^m.8$, −0° 57′.1.

EDWARD ORAVEC

JUPITER'S SATELLITES

Jupiter's four bright moons have the positions shown below for the GCT given. The motion of each satellite is from the dot to the number designating it. Transits of satellites over Jupiter's disk are shown by open circles at the left, and eclipses and occultations by black disks at the right. Reproduced from the **American Ephemeris and Nautical Almanac.**





In this comparison of the current brightness changes of Mercury and Venus, note that each planet is on a different magnitude and time scale.

times. When it is at perihelion, its greatest elongation may be only 18°; at aphelion, it may be 28° from the sun, but then it appears nearly a magnitude fainter. Because of the orientation of Mercury's orbit and the factors mentioned in the next paragraph, the elongations at aphelion always favor observers in the Southern Hemisphere.

The most favorable time for observing the inferior planets is when the ecliptic is nearly perpendicular to the horizon. In the Northern Hemisphere, this occurs in April in the evening, and in October in the morning sky. These are also the best times for viewing any planet near the sun. In the Southern Hemisphere, eastern elongations in October are most favorable, and western elongations in April.

With all conditions favorable, it is possible for an observer with binoculars to find Mercury seven days before or after superior conjunction; with the naked eye the interval is about 10 days. At that time, the planet may be as bright as Sirius. Look for Mercury about the 10th of June this year, 25 days before greatest eastern elongation. It should be possible to find the planet with slight optical aid. Its magnitude will be −1.1. In the morning sky, you may follow Mercury two weeks or more after the August and December elongations this year.

To locate Mercury in the evening, watch where the sun sets and begin to look in that region 10 minutes later, several degrees above the horizon. The planet appears a pale red which is usually intensified by its nearness to the horizon. If you know its position relative to the sun, as found in the **American Ephemeris** or in the **Nautical Almanac**, the planet should be more readily found. Although on occasion Mercury can be followed for a month at elongation, two weeks is the average.

The synodic period (from one inferior conjunction to the next) is 116 days, with large variations, so there are generally six elongations per year, and sometimes seven. Many factors combine to make each elongation different from the others, so some elongations are excellent, some fair, and others very poor. Mercury, which Copernicus is reputed never to have seen, is indeed a fascinating planet to study.

Next month we shall consider the brightest planet, Venus.

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PHASES OF THE MOON

First quarter	June 6, 16:06
Full moon	June 14, 18:42
Last quarter	June 22, 13:12
New moon	June 29, 4:06

GREENWICH CIVIL TIME (GCT)

TIMES used on the Observer's Page are Greenwich civil or universal time, unless otherwise noted. This is 24-hour time, from midnight to midnight; times greater than 12:00 are p.m. Subtract the following hours to convert to standard times in the United States: EST, 5; CST, 6; MST, 7; PST, 8. If necessary, add 24 hours to the GCT before subtracting, and the result is your standard time on the day preceding the Greenwich date shown. To convert standard time to daylight saving time, add one hour.

VARIABLE STAR MAXIMA

These predictions of variable star maxima are made by Leon Campbell, recorder of the A.A.V.S.O., Harvard College Observatory, Cambridge 38, Mass. Serious-minded observers interested in making regular telescopic observations of variable stars may write to Mr. Campbell for further information.

Only stars are included here whose mean maximum magnitudes, as recently deduced from a discussion of nearly 400 long-period variables, are brighter than magnitude 8.0. Some of these stars, but not all of them, are nearly as bright as maximum two or three weeks before and after the dates for maximum. The data below include, in order, the day of the month near which the maximum should occur, the star name, the predicted magnitude, and the star designation number, which gives the rough right ascension (first four figures) and declination (bold face if southern).

June 2, U Herculis, 7.6, 162119; 3, T Columbae, 7.6, 0515**33**; 6, V Coronae Borealis, 7.4, 154639; 16, V Ophiuchi, 7.5, 1621**12**; 17, S Hydrae, 7.9, 084803; 18, R Draconis, 7.6, 163266; 20, RT Sagittarii, 7.9, 2011**39**; 22, R Aquarii, 7.3, 2338**15**; 25, S Pavonis, 7.3, 1946**59**; 28, S Ursae Majoris, 7.9, 123961.

OCCULTATION PREDICTIONS FOR JUNE

1-2 VENUS −3.4, ..., 2, +51° −7° Im: **H** 23:43.0 −2.2 −0.1 77°. Em: **H** 1:02.2 −1.1 −2.0 295°.

2-3 **9 Cancri** 6.2, 8:03.1 +22-47.5, 3, +90° +29° Im: **G** 4:57.0 +0.3 −1.8 125°; **H** 5:32.0 +1.2 −3.2 168°; **I** 5:01.9 +0.3 −2.0 136°.

6-7 **Nu Virginis** 4.2, 11:43.1 +6-49.9, 7, +90° +4° Im: **G** 7:26.9 −0.4 −1.4 71°; **H** 7:45.1 −0.4 −1.4 97°; **I** 7:23.8 −0.7 −1.5 80°.

9-10 **598 B Virginis pr.** 6.5, 13:52.1 −7-47.6, 10, +83° +3° Im: **A** 4:45.1 −1.4 −1.3 83°; **B** 4:39.8 −1.4 −1.2 79°; **C** 4:42.7 −1.6 −1.3 92°; **D** 4:32.6 −1.7 −1.2 87°; **E** 4:15.4 −2.0 −1.3 107°; **F** 4:17.4 −1.8 −2.0 136°; **H** 3:37.2 −0.5 −2.4 168°.

10-11 **6 B Librae** 6.2, 14:34.1 −12-04.6, 11, +78° −4° Im: **A** 2:27.3 −2.7 +0.1 81°; **B** 2:25.3 −2.7 +0.3 76°; **C** 2:15.8 −2.5 −0.2 98°; **D** 2:10.3 −2.3 +0.2 91°; **E** 1:47.4 −1.5 −0.2 120°; **F** 1:49.9 −0.5 −2.0 160°.

18-19 **37 Capricorni** 5.8, 21:31.8 −20-19.6, 19, +70° +18° Em: **A** 9:42.5 −1.0 +0.9 211°; **C** 9:33.8 −1.2 +1.3 211°; **E** 9:13.5 −1.8 +1.1 231°; **F** 8:43.7 −2.0 +2.2 218°; **H** 8:16.1 −1.4 +2.0 232°.

Observers on the West Coast will have an opportunity to watch an occultation of Venus, or a very close conjunction, on the 1st of June. It will occur in the afternoon, so some effort will be needed to locate Venus and the thin crescent of the moon in the daytime sky. The position of Venus at 24:00 June 1 (0^h on the 2nd) is 6^h 46^m 55^s, +24° 39′.

For selected occultations (visible at three or more stations in the U. S. and Canada under fairly favorable conditions), these predictions give: evening-morning date, star name, magnitude, right ascension in hours and minutes and declination in degrees and minutes, moon's age in days, limiting parallels of latitude, immersion or emersion; standard station designation, GCT, a and b quantities in minutes, position angle; the same data for each standard station westward. Longitudes and latitudes of standard stations are:

A +72°.5, +42°.5	**E** +91°.0, +40°.0
B +73°.6, +45°.6	**F** +98°.0, +30°.0
C +77°.1, +38°.9	**G** +114°.0, +50°.9
D +79°.4, +43°.7	**H** +120°.0, +36°.0
I +123°.1 +49°.5	

The a and b quantities tabulated in each case are variations of standard-station predicted times per degree of longitude and of latitude respectively, enabling computation of fairly accurate times for one's local station (long. Lo, lat. L) within 200 or 300 miles of a standard station (long. LoS, lat. LS). Multiply a by the difference in longitude (Lo — LoS), and multiply b by the difference in latitude (L — LS), with due regard to arithmetic signs, and add both results to (or subtract from, as the case may be) the standard-station predicted time to obtain time at the local station. Then convert the Greenwich civil time to your own standard time.

For additional occultations consult the American Ephemeris and Nautical Almanac and the British Nautical Almanac, from which these predictions are taken. Texas predictions were computed by E. W. Woolard and Paul Herget.

MINIMA OF ALGOL

June 1, 11:34; 4, 8:23; 7, 5:12; 10, 2:00; 12, 22:49; 15, 19:38; 18, 16:27; 21, 13:15; 24, 10:04; 27, 6:53; 30, 3:42.

ECLIPSES IN JUNE

This is the eclipse season, but observers in the Western Hemisphere will not be favored, either by the total eclipse of the moon on June 14th, or by the partial eclipse of the sun on June 29th. The latter occurs in the north polar regions, and only 18 per cent of the sun's diameter is obscured at maximum.

The lunar eclipse magnitude is 1.4 times the moon's diameter, with the duration of totality 1½ hours, and the eclipse will be seen in the South Pacific, Australia, Asia, Europe, Africa, and the extreme eastern part of South America.

COMET TEMPEL RETURNS

With the 24-inch reflector of the Yerkes Observatory, Professor G. Van Biesbroeck has observed Comet Tempel II, which was not seen in 1935 or 1941, although it was observed nine times since its discovery in 1873. On May 1st, the comet had a small, diffuse round coma of magnitude 17, so it is too faint for amateur observation. Its position was very near that predicted by Manchurian astronomer P. Ramensky.

Astronomical Shoulder Patch

World War II brought into being a good many new and varied designs in that most honored emblem of any soldier — his shoulder patch. One of the most unique was that belonging to the men of the POA (Pacific Ocean Areas). It contained the Big Dipper and the Southern Cross, the Dipper pointing to the North Star.

The patch had a blue background with white stars and a red arrow streaking between the two constellations. The Dipper in its inverted position was at the top of the patch; beneath it pointing at 11 o'clock was the arrow. Below was the Southern Cross.

Symbolically, the arrow was supposed to represent the path to Tokyo in relation to the two constellations as seen from the Hawaiian Islands, headquarters of the POA.

R. Albert Spong

NAVIGATION NOTES

(Continued from page 9)

field. By adding a second "index" mirror to the new instrument, however, with appropriate scales, simultaneous sighting of two stars may also be achieved and a single observation gives directly true latitude and correct longitude. A refinement is the addition of clockwork to the Greenwich hour angle scales.

A "stellar cap" transforms the spherical sextant into its third form, in which it is well suited to high-speed aerial navigation. Six or seven stars are selected for each such cap, and their images are brought together by adjustment of the various scales on the sextant. Stellar caps can be interchanged at will, and it is not necessary that all the stars be seen if clouds obscure a portion of the sky. It is said that all the star images may be fused into a single image, thus providing a very accurate sight.

Here and There with Amateurs

This is not intended as a complete list of societies, but rather to serve as a guide for persons near these centers, and to provide information for transplanted amateurs who may wish to visit other groups. The asterisks denote societies whose members receive *Sky and Telescope* as a privilege of membership.

City	*Organization*	*Date*	*P.M.*	*Season*	*Meeting Place*	*Communicate with*
BOSTON	*Bond Ast. Club	1st Thu.	8:15	Oct.-June	Harvard Obs.	Miriam Dickey, Harvard Observatory
"	*A.T.M.s of Boston	2nd Thu.	8:00	Sept.-June	Harvard Obs.	A. G. Hall, 206 Maplewood St., Watertown
BROOKLYN, N.Y.	Astr. Dept., B'klyn Inst.	Rd. Table 3rd Thu.	8:15	Oct.-April	Brooklyn Inst.	William Henry, 154 Nassau St., N. Y. C., *BA.* 7-9473
BUFFALO	A.T.M.s & Observers	1st, 3rd Fri.	8:00	Oct.-June	Mus. of Science	J. J. Davis, Museum of Science
CHATTANOOGA	Barnard A. S.	4th Fri.	7:30	All year	Chattanooga Obs.	C. T. Jones, 302 James Bldg., *CHat.* 7-1936
CHICAGO	*Burnham A. S.	2nd Tue.	8:00	Sept.-June	Chi. Acad. of Sciences	Miss W. Sawtell, 928 N. Harvey, Oak Park
"	Chicago A. S.	Monthly	8:00	....	Adler Planetarium	Adler Plan., *Wabash* 1428
CINCINNATI	*Cin. A. A.	2nd Fri.	8:00	Sept.-June	Cincinnati Obs.	Dan McCarthy, 1622 DeSales Lane
CLEVELAND	Cleveland A. S.	Fri.	8:00	Sept.-June	Warner & Swasey Obs.	Virginia Burger, Warner & Swasey Obs.
COLUMBIA, S. C.	Northern Cross A.S.	Every Mon.	8:15	All year	Melton Observatory	Dr. L. V. Robinson, Univ. of S. C.
DAYTON	A.T.M.'s of Dayton	3rd Sat.	Eve.	....	Private homes	W. C. Braun, New Lebanon
DAYTONA BEACH	D. B. Stargazers	Alt. Mon.	8:00	Nov.-June	500 S. Ridgewood Ave.	Rolland E. Stevens, 500 S. Ridgewood
DETROIT	*Detroit A. S.	2nd Sun.	3:00	Sept.-June	Wayne U., Rm. 187	E. R. Phelps, Wayne University
"	*Northwest A. S.	3rd Tue.	8:00	Sept.-June	Redford High Sch.	John W. Broxholm, 21412 Pickford
DULUTH, MINN.	Duluth Ast. Club	Meetings suspended				Ray S. Huey, 1822 E. 3rd St.
FT. WORTH	Tex. Observers	No regular meetings				Oscar E. Monnig, 1010 Morningside Dr.
GADSDEN, ALA.	Ala. A. A.	1st Thu.	7:30	All year	Ala. Power Audit.	Brent L. Harrell, 1176 *W* or 55
GENEVA, ILL.	*Fox Valley A. S.	3rd Tue.	8:00	....	Geneva City Hall	Wm. Siekman, Woodlawn Ave., Batavia
HOUSTON	*Houston A. S.	Last Fri.	7:30	All year	Mus. Nat. Hist. Annex	W. D. Martin, 5624 Dwinnel Dr.
INDIANAPOLIS	Indiana A. A.	1st Sun.	2:15	All year	Odeon Hall	E. W. Johnson, 808 Peoples Bank Bldg.
JOLIET, ILL.	Joliet A. S.	Alt. Tue.	8:00	Oct.-May	Jol. Mus. & Art Gall'y	Mrs. Robert L. Price, 403 Second Ave.
LOS ANGELES	L.A.A.S.	2nd Thu.	8:15	....	2606 W. 8th St.	A. M. Newton, 2606 W. 8th St.
LOUISVILLE, KY.	L'ville A. S.	1st Tue.	8:00	Sept.-May†	University Center, Univ. of Louisville	B. F. Kubaugh, 621 S. 34th St.
MADISON, WIS.	Madison A. S.	2nd Wed.	8:00	All year	Washburn Obs.	Dr. C. M. Huffer, Washburn Obs.
MEMPHIS	A.T.M.s of Mem.	Meetings suspended				R. E. Wendt, Jr., 2084 Linden Ave.
MIAMI, FLA.	Southern Cross A.S.	Every Fri.	7:30	All year	M. B. Lib. Grounds	A. P. Smith, Jr., 426 S.W. 26th Road
MILWAUKEE	Milw. A. S.	1st Thu.	6:15	Oct.-May††	City Club	E. A. Halbach, 2971 S. 52 St.
MOLINE, ILL.	*Pop. Ast. Club	Wed.†††	7:30	Feb.-Nov.	Sky Ridge Obs.	Carl H. Gamble, Route 1
NEW HAVEN	New Haven A.A.S.	4th Sat.	8:00	Sept.-June	Yale Obs.	J. J. Neale, 29 Fairmont Ave.
NEW ORLEANS	A.S. of N. Orleans	Last Wed.	8:00	Sept.-May	Cunningham Obs.	Dr. J. Adair Lyon, 1210 Broadway
NEW YORK	*A.A.A.	1st, 3rd Wed.	8:15	Oct.-May	Amer. Mus. Nat. Hist.	G. V. Plachy, Hayden Plan., *EN.* 2-8500
"	Junior Ast. Club	1st, 3rd Fri.	8:00	Oct.-May	Amer. Mus. Nat. Hist.	J. B. Rothschild, Hayden Plan., *EN.* 2-8500
NORFOLK, VA.	*A.A.S. of Norfolk	2nd Thu.	8:00	All year	635 W. 29th St.	P. N. Anderson, 635 W. 29th St.
NORWALK, CAL.	Excelsior Tel. Club	Thu.	7:00	All year	Excelsior Union H. S.	Geo. F. Joyner, 410 Sproul St.
NORWALK, CONN.	Norwalk Ast. Soc.	Last Fri.	8:00	Sept.-June	Private houses	Mrs. A. Hamilton, 4 Union Pk., 6-5947
OAKLAND, CAL.	*Eastbay A. A.	1st Sat.	8:00	Sept.-June	Chabot Obs.	Miss H. E. Neall, 6557 Whitney St.
OWENSBORO, KY.	*Owensboro A. C.	3rd Sat.	8:00	All year	Public Library	Herman Batt, 1507 Hathaway St.
PHILADELPHIA	A. A. of F. I.	3rd Fri.	8:00	All year	The Franklin Inst.	Edwin F. Bailey, *Rit.* 3050
"	*Rittenhouse A. S.	2nd Fri.	8:00	Oct.-May	The Franklin Inst.	A. C. Schock, *Rit.* 3050
PITTSBURGH	*A.A.A. of P'burgh	2nd Fri.	8:00	Sept.-June	Buhl Planetarium	Louis E. Bier, 837 Estella St.
PONTIAC, MICH.	*Pontiac A.A.A.	2nd Thu.	8:00	All year	Private homes	Harvey E. Orser, 34 Pine St.
PORTLAND, ME.	A.S. of Maine	2nd Fri.	8:00	All year	Private homes	H. M. Harris, 27 Victory Ave., S. Portland
PORTLAND, ORE.	*Ast. Study Group	1st Tue.	8:00	All year	309 Public Serv. Bldg.	H. J. Carruthers, 427 S. E. 61 Ave.
PROVIDENCE, R. I.	Skyscrapers, Inc.	Mon. or Wed.	8:00	All year	Ladd Observatory	Ladd Obs., Brown U., *GA.* 1633
RENO, NEV.	A.S. of Nev.	4th Wed.	8:00	All year	Univ. of Nevada	G. B. Blair, University of Nevada
ROCHESTER, N. Y.	Roch. Ast. Club	Alt. Fri.	8:00	Oct.-May	Univ. of Rochester	M. L. Groff, 400 University Ave.
SACRAMENTO	Sac. Val. A. S.	....	8:00	All year	Sacramento College	S. J. Smyth, 246 41st St.
SAN DIEGO, CAL.	Ast. Soc. of S. D.	1st Fri.	7:30	Oct.-June	504 Elec. Bldg.	R. M. Lippert, Box 41, N. Park Sta.
SCHENECTADY	S'tady Ast. Club	Meetings suspended				C. H. Chapman, 216 Glen Ave., Scotia
SOUTH BEND, IND.	St. Joseph Val. Ast.	Last Tue.	8:00	All year	928 Oak St.	F. K. Czyzewski, South Bend Tribune
TACOMA, WASH.	Tacoma A.A.	1st Mon.				Dorothy E. Nicholson, 2816 No. Union Ave.
TULSA, OKLA.	Tulsa A.S.	Occasional meetings				V. L. Jones, 4-8462
WASHINGTON, D.C.	Nat'l. Cap. Ast'mers	1st Sat.	8:00	Oct.-June	U. S. Nat'l. Museum	Mrs. Wm. Harris, 4315 Chesapeake, N.W.
WICHITA, KANS.	*Wichita A.S.	2nd Tue.	8:00	All year	E. High Sch., Rm. 214	S. S. Whitehead, 2322 E. Douglas, 33148
WORCESTER, MASS.	*Aldrich Ast. Club	2nd Tue.	7:30	All year	Mus. Natural History	Ruth Foley, 9 Oberlin St., 63101
YAKIMA, WASH.	Yak. Am. Ast'mers	1st Tue.	8:00	All year	Chamb. of Comm. Bldg.	Edward J. Newman, 324 W. Yakima Ave.

†June, Jul., Aug., informal meetings. ††Dinner meeting. †††Nearest 1st-quarter moon.

DEEP-SKY WONDERS

HERE IS a variety of objects for telescopic observation in June. The first four are far south of the celestial equator.

Centaurus. Omega Centauri, situated at $13^h\ 23^m.5$, $-47°\ 1'$; bright enough to be seen with the unaided eye. In opera glasses it looks like a fuzzy star. It is apparently the largest, and is one of the nearest globulars; photographs show it to be slightly elliptical.

Hydra. M83, $13^h\ 34^m.3$, $-29°\ 37'$; spiral. This object is large, dim, roundish, with a starlike center. Its distance is nearly three million light-years. It is located near the head of the Centaur.

Scorpius. NGC 6231 (3651h), $16^h\ 47^m$, $-41°\ 38'$; a cluster of 120 bright stars. H18, $17^h\ 49^m.7$, $-35°\ 16'$; a cluster of 80 stars near M7; if your latitude is northerly, look for it toward the close of June.

Serpens Caput. M5, $15^h\ 15^m.8$, $+2°\ 17'$; apparently the largest globular in the northern heavens. It can be glimpsed without optical aid. L. S. COPELAND

STARS FOR JUNE

from latitudes 30° to 50° north, at 9 p.m. and 8 p.m., local time, on the 7th and 23rd of the month, respectively. The 40° north horizon is a solid circle; the others are circles, too, but dashed in part. When facing north, hold "North" at the bottom, and similarly for other directions. This is a stereographic projection, in which the flattened appearance of the sky itself is closely reproduced, without distortion.